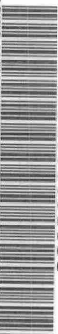


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THE DEVELOPMENT DOCUMENT FOR THE DRAFT EFFLUENT MONITORING REGULATION FOR THE PULP AND PAPER SECTOR



**Environment
Ontario**

Jim Bradley
Minister

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THE DEVELOPMENT DOCUMENT FOR
THE DRAFT EFFLUENT MONITORING REGULATION
FOR THE PULP AND PAPER SECTOR

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PART 1

OVERVIEW OF THE PULP AND PAPER SECTOR

1. INTRODUCTION

There are twenty seven (27) pulp and paper mills located throughout the Province of Ontario which discharge waste effluent into surface watercourses. Of these twenty seven, sixteen mills are located in Northern Ontario, five in Eastern Ontario and the remaining six in South - Central Ontario.

Five mills discharge into northern watersheds. Two of these drain via the English and Winnipeg River systems into Lake Winnipeg. The other three drain into James Bay via large river systems.

One mill, located near Huntsville, discharges into a small river which drains into Vernon Lake.

The balance of the mills all discharge either directly or via river systems into the Great Lakes.

Historically, pulp and paper mills discharged solids and dissolved organic and inorganic materials into the receiving waters of the Province, in quantities that were frequently measurable in several tens of tons per day. Remedial programs to reduce these large discharges were developed by Ontario in the late 1960's. Since 1965, reductions in suspended solids of better than 90% and in BOD5 of better than 60%, have been accomplished primarily through the mechanism of control orders. Notwithstanding these reductions, the rate of progress has been slow. Previous governments showed a reluctance to speed up the implementation of remedial programs for this industry for a variety of economical and political reasons. Also, the Industry was reluctant to install expensive pollution abatement systems in Ontario when such requirements were not being applied in other jurisdictions in North America.

Environmental concern no longer rests only with discharges of suspended solids and oxygen-demanding substances, but as a result of research by government, institutions and industry itself throughout the world, has expanded into acute toxicity, chronic toxicity, persistent toxic substances, mutagenic substances, bio-accumulation of toxic substances by fish and aquatic organisms and tainting of fish flesh.

In many cases, the long-term effects of these discharges on the environment are not well known and understood. This uncertainty creates the need for governments to be conservative when developing regulations as well as the need for more research into the long-term effects of these discharges on the environment.

2. HISTORICAL REVIEW

In the early 1960's, the Government of Ontario, through the Ontario Water Resources Commission, began investigating the quantity and quality of pulp and paper mill effluents being discharged into Ontario's waters. The results of these investigations were very enlightening and showed that the effluents at that time contained waste products which were measurable in tons per day. Of particular concern were the very large quantities of suspended solids and oxygen-demanding wastes which were being discharged into surface waters.

These findings resulted in the development of a pulp and paper abatement strategy which was formulated in the late 1960's. This strategy comprised a five year abatement plan which called for large reductions in the discharges of suspended solids within two years and large reductions in the discharges of oxygen-demanding wastes within five years. The strategy also outlined the in-plant control and waste treatment technologies that were available at that time to meet the requirements.

In the late 1960's, the Federal Government developed regulations under the Fisheries Act aimed at reducing the discharge of "deleterious substances" into both fresh and marine waters across the country. These regulations were promulgated in 1971. For "new and expanded mills," the regulations established allowable discharges of suspended solids and BOD5, and required that mill discharges pass a toxicity test. Guidelines were issued for existing mills which generally reflected the Ontario requirements. (ref: Federal Pulp and Paper Regulations)

Some success was achieved as a result of these two initiatives. By the mid-1970's, most Ontario mills had installed facilities for the removal of suspended solids which brought them into compliance with the Federal guidelines and/or requirements. At some locations, Ontario required additional suspended solids reduction based on identified local effects. These were achieved by industry and government through a program of "Control Orders."

In the case of oxygen-demanding substances, progress has been slower. For kraft mills, the Ontario program identified biological oxidation and in-plant control as the technologies necessary to achieve the reduction of oxygen demanding substances. Industry did not share the Ministry's enthusiasm for biological oxidation systems due to high capital and operating costs and a concern that installing such a system would not necessarily guarantee that discharge limit requirements would be met. There was also concern expressed about the operation of biological systems in the climate of Northern Ontario and their performance during winter months. The Industry also contended that in most cases, effects due to mill discharges were localized and rarely discernable at distances from the mills. Thus large capital expenditures for biological systems might only result in minimal benefits to the overall environment.

Three kraft mills have installed biological treatment systems in Ontario, at locations where the discharges were proven to have had pronounced effects on the receiving watercourse.

In addition, one paperboard mill which discharges to a small river, operates an aerated lagoon system and two mills which de-ink wastepaper, operate high rate biological oxidation systems.

Sulphite mills, which for the most part did not operate chemical recovery systems in the late 1960's when the requirements were initially formulated, discharged extremely large amounts of organic, oxygen-demanding substances. For these mills, chemical recovery or biological oxidation systems were identified as the technology alternatives available for the reduction of oxygen-demanding substances. In some cases, mills converted to other sulphite processes which could be operated economically with recovery but, in most cases, installation of chemical recovery or biological oxidation would have been uneconomic.

Some sulphite pulping operations were shut down with production being replaced with thermal/mechanical or thermal/chemical/mechanical pulping processes in most cases. Other mills installed higher yield sulphite pulping processes or supplemented sulphite pulps with recycled or repulped fibre. These changes resulted in reductions in the amounts of oxygen-demanding wastes discharged by the mills.

Of the five mills currently employing sulphite pulping, two practice chemical recovery and the remaining three discharge untreated pulping liquors. The neutral sulphite semi-chemical pulping operation also discharges untreated spent pulping liquors.

Effluents from most mills which produce pulp from raw wood exhibit toxicity, regardless of the pulping processes used, unless they are treated. The degree of toxicity differs from mill to mill in Ontario and is a function of the pulping processes used, the wood species utilized, the amount of water used, the management practices for items such as spill control, and the nature of any external treatment.

Kraft mill effluents are of particular concern due to the presence of chlorinated organics, attributed to the use of chlorine and chlorine compounds in the bleaching operations. Certain chlorinated organics reportedly found in small quantities in kraft mill effluents, (chlorinated dibenzo-p-dioxins and chlorinated dibenzofurans) have been shown to be toxic, persistent in the environment and to accumulate in fish and aquatic animals.

Three Ontario kraft mills have installed biological oxidation systems, with one of the three also operating the only oxygen delignification system in Canada. At these mills, toxicity of the effluents has been reduced considerably and at the mill with oxygen delignification, the effluent is normally non-lethal. (Rainbow Trout LC50, toxicity test).

3. ENVIRONMENTAL CONCERNS OF PULP AND PAPER MILL EFFLUENTS

Over the years, numerous papers and reports have been written in Canada, the United States, Scandinavia and Europe which document both general and specific environmental concerns about all segments of the pulp and paper sector. A short reference list which is considered appropriate, is presented in Table 1.

Reference 1. in Table 1, a document which was prepared by the U.S. Environmental Protection Agency, is probably the most comprehensive document available and discusses the environmental concerns of the various sectors of the industry. The document was published in 1982 and was based on work completed in the mid to late 1970's.

TABLES 2, 3, and 4 indicate specific chemicals that have been found or tentatively identified in pulp and paper mill effluents.

TABLE 2, "Parameters Of Concern Identified In Pulp and Paper Mill Effluents," is a list of compounds which was compiled by the Ministry from the literature referenced in TABLE 1. Each of these compounds is deemed to be of concern for the reasons shown.

TABLE 3, "Pre-Regulation Monitoring Open Characterization Data," lists those compounds which were tentatively identified as being present in trace quantities in effluents sampled by the Industry and the Ministry in a pre-regulation monitoring sampling program. The chemicals were tentatively identified by GC/MS library search routine. GC/MS, which stands for gas chromatography/ mass spectroscopy, is an

analytical technique wherein chemical compounds are extracted from effluents by solvent extraction, separated by gas chromatography and then tentatively identified by computer comparison of their mass spectra with spectra in a "standard library." In some cases, tentative identification can be positive identification but in other cases, more detailed work would be required before a positive identification could be claimed.

TABLE 4, "Pre-Regulation Monitoring EMPPL Data," lists those compounds from EMPPL which were positively identified by Industry and the Ministry as being present in effluent samples collected under the pre-regulation monitoring program.

The range of chemicals is large. This should not be surprising if it is remembered that the basic starting material in this industry is "wood" which itself contains a wide variety of chemicals. Many of these chemicals are leached from the wood during pulping operations and new chemical substances are also formed during chemical pulping and bleaching operations.

Chemical groups generally acknowledged to be of environmental concern are resin and fatty acids (common to all wood species) and chlorinated organics which arise from the use of chlorine and chlorine compounds in pulp bleaching operations. Other chemical groups are also of concern and include sulphur compounds, phenolics and metals.

Environmental concerns about pulp and paper mill discharges are normally due to one or a combination of the following:-

- * they may contain large amounts of suspended solids which could be injurious to fish and aquatic life and which could settle out in the receiving waters, blanketing the bottom and rendering it inhospitable to normal populations of benthic fauna.
- * they may exert an excessive oxygen demand on the receiving waters, which could result in a depletion of dissolved oxygen concentrations.
- * they may show acute toxicity to fish and other aquatic animals when tested in a laboratory;
- * they may contain chemicals which are toxic to humans;
- * they may contain chemicals which have been shown to have or may potentially have chronic (long term) toxic effects on fish and other aquatic life;
- * they may contain chemicals which are known to be persistent (or are chemically similar to known persistent chemicals and therefore potentially persistent) and which will not break down in the environment in the short term;
- * they may contain chemicals which are known to bio-accumulate in fish and other aquatic life;
- * they may contain chemicals which are known carcinogens or suspected of being carcinogenic due to their chemical similarity to known carcinogens;

- * they may contain chemicals which are known mutagens or suspected of being mutagenic;
- * they may create problems of taste and odour in fish and drinking water supplies;

4. THE NEED FOR REGULATION

At present, Ontario pulp and paper mills monitor their effluents, at their own costs, under the Ministry of the Environment's Industrial Monitoring Information System requirements or under requirements imposed by the Ministry in Control Orders.

The data reported to the Ministry under these programs include:

- biochemical oxygen demand (BOD5)
- suspended solids
- pH
- conductivity
- nitrogen
- total phosphorus
- phenols
- some metals
- toxicity testing

Monthly average IMIS data is published for each mill by the Ministry in the annual report, "Report on the Industrial Discharges in Ontario."

Currently, the Ministry of the Environment utilizes "Control Orders" issued under the Ontario Water Resources Act or The Environmental Protection Act, to impose abatement requirements on industry. The new MISA initiative, which was announced in 1986, has as its goal the virtual elimination of the discharge of persistent toxic substances into the waters of Ontario from municipalities and industry. This goal will be accomplished by the development of regulations which will impose limits on the amounts of individual toxic substances (or groups of substances) as well as the so-called conventional parameters that may be discharged in an individual plant effluent. These limits will be based on the application of " best available technology, economically achievable, (BATEA)."

As a first step in the development of limits regulations for the pulp and paper sector it is necessary to ascertain precisely what toxic chemicals are contained in the mill discharges. This will be accomplished by monitoring each separate discharge under stringent conditions required for measuring flow, collecting samples, storing samples and finally, analyzing the samples. Using historical data, information from the literature and information gained from a pre-regulation monitoring program, a list of substances has been developed which is applicable to the sector and which will form the basis for the analytical requirements.

MISA policy requires that industry will perform the monitoring at its own cost. In order to ensure that the monitoring of individual discharges is carried out under the required conditions and for the required chemical substances, the Ministry proposes to issue an "Effluent Monitoring Regulation." This regulation will legally require mills to perform the monitoring and will carry with it the penalties for non-compliance as prescribed under the Environmental Protection Act.

PART 11

TECHNICAL RATIONALE
FOR THE
MONITORING REQUIREMENTS

1. INTRODUCTION

The purpose of the technical rationale section is to explain the steps in the development of the Pulp And Paper Effluent Monitoring Regulation

The section provides background information on the options considered in arriving at the specific monitoring approach to be used for mills in this sector. It also provides background information on the rationale used to select the parameters to be monitored and the frequency at which they shall be monitored.

2. THE APPROACH TO REGULATION DEVELOPMENT

The MISA program for regulation development is based on a joint consultative approach with Industry and the Federal Government.

A JOINT TECHNICAL COMMITTEE, (JTC) comprising technical representatives from the Ministry, Industry and the Federal, Department of the Environment was established late in 1986. This committee held its first meeting in November, 1986 at which time the general membership was ratified. Also, a member of the public, appointed to the MISA Advisory Committee, was invited to participate in committee meetings.

The JTC served as a vehicle for resolving problem areas and for reaching consensus on the content of the regulation. To assist the JTC, a number of working groups or sub-committees were established. These groups advised the JTC on highly specific technical areas or performed specific functions for the committee. Of particular note were the following:-

1. The Analytical Working Group - primarily used to develop new analytical protocols and resolve problems related to chemical analysis.
2. The Flow Measurement Sub-Committee - charged with making recommendations on the flow measurement and sampling requirements to be included in the monitoring regulation. A consultant was hired at the recommendation of the JTC to assist the sub-committee in gathering the data necessary to complete the task.
3. The Stormwater Sub-Committee - charged with assisting a consultant to conduct a study of all point source stormwater discharges throughout the sector and to review the consultant's report prior to submission to the JTC.
4. The Regulation Writing Sub-Committee - charged with preparing the text of a draft sector regulation and with developing the rationale for monitoring requirements, including the frequency of sampling and the analytical requirements for the various types of effluent discharges.

The JTC held 13 meetings during the course of the regulation development. Consensus was often difficult to reach on items where a fundamental difference of opinion existed between the Industry and the Ministry. In some cases, the Ministry found it necessary to insist on a certain course of action particularly where any deviation would conflict with Ministry policies.

To assist with the development of the regulation the Industry, under the auspices of the Ontario Forest Industries Association, undertook a comprehensive study of the composition of mill effluents being discharged directly to surface waters throughout Ontario. The study was designed to generate a database of mill effluent quality and cost in the order of \$1 million.

The results of this study were submitted to the Ministry in a document entitled, "Ontario Pulp and Paper Mills - Effluent Composition - May 1988."

3. MILL CLASSIFICATION

The mills in Ontario manufacture a wide range of products with newsprint being predominant and accounting for over half the production. Other products include, bleached kraft market pulps, groundwood specialty papers, fine papers, linerboard, corrugating medium, paperboard and tissue products.

A wide variety of pulping and paper-making processes are employed in the manufacture of these products. Nineteen of the mills manufacture pulp directly from logs or wood chips, either for use directly in the manufacture of other products or for sale in world markets. The other eight mills either purchase pulp or use waste paper products as a source of raw materials for their manufacturing processes.

APPENDIX 1, SUMMARY DATA OF ONTARIO MILLS, contains basic data on each of the 27 operating mills in the Province of Ontario.

Nine mills operate the "kraft" pulping process. Eight of these mills use combinations of chlorine, chlorine dioxide and hypochlorite to produce a range of bleached kraft pulps which are either used internally in the manufacture of finished paper products or sold externally. The other kraft mill manufactures linerboard as its predominant product but also uses chlorine bleaching to produce semi-bleached kraft pulp which is used in the manufacture of newsprint.

Products from these nine kraft mills include bleached kraft market pulps, fine papers, newsprint and specialty groundwood paper products. Two of the kraft mills which manufacture newsprint and specialty groundwood papers, also produce pulp by mechanical pulping and one of the two operates a sulphite pulping process.

Five mills operate "sulphite" pulping processes to produce pulps which are used in the manufacture of newsprint. Each of these mills produces mechanical pulps which constitute the major component of newsprint. One of the mills, as mentioned above, is integrated with a kraft mill complex.

Four mills operate mechanical or chemical/mechanical pulping processes to produce pulps which are used in the manufacture of newsprint, specialty groundwood products or fine papers. Pulps to supplement the mechanical pulps are normally purchased except at one mill which recycles waste paper. This mill manufactures supplementary pulp by a deinking process.

Two mills manufacture corrugating medium by chemical pulping processes. One mill employs the "neutral sulphite, semi-chemical" (NSSC) process while the other uses a sodium carbonate process.

Three mills manufacture a wide range of fine papers using purchased pulps. One of these mills produces supplementary pulp by deinking recycled waste paper. These mills do not operate any wood pulping processes.

Three mills produce a range of paperboard and cardboard products from recycled waste paper and waste cardboard. Since the products do not require a high degree of whiteness, deinking is not necessary. These mills do not operate any wood pulping processes.

Lastly, two mills manufacture a range of tissue and crepe paper products from purchased pulps. These are fairly simple operations and do not involve any wood pulping.

With this diverse range of manufacturing processes and products, it is not difficult to understand that no two mills are alike. This fact is a complicating factor when the development of regulations is being considered for this industry.

In reviewing the operations at individual mills and having knowledge of the chemicals that are likely to be of concern at each mill, the Ministry determined that it would be possible to classify mills into a limited number of groups. This would simplify the regulation and make it more manageable.

For example, not all of the effluents from the nine kraft mill exhibited the presence of the same chemicals in the pre-regulation monitoring program. It is reasonable to assume, however, that the same chemicals could be potentially present at all nine mills even acknowledging that there are differences in process operations, wood species, chemical consumption, etc.

Also, sulphite pulping operations in Ontario, although exhibiting a wide range of chemicals in their effluents, do not use chlorine or chlorine dioxide for bleaching and are normally associated with mechanical pulping operations. The chemicals of concern are similar for both sulphite and mechanical pulping operations and for these reasons the two can be classified together.

The effluents from corrugating-medium pulping operations exhibit concerns similar to those of sulphite mill effluents but the mills are placed in a separate category due to the different nature of their product.

A similar rationale holds for those mills which do not produce pulp from raw wood (deinking, board, fine papers, and tissue) and they are classified together.

Finally, it was noted that certain basic analytical requirements are applicable to all mills regardless of category.

The categories of mills used in the regulation are:-

- KRAFT
- SULPHITE/MECHANICAL
- CORRUGATING
- DEINKING/BOARD/FINE PAPER/TISSUE

Section 3.1 of the monitoring regulation sets out the mills in each of the categories.

4. PRE-REGULATION MONITORING

As part of the regulation development process, the pulp and paper industry of Ontario, under the auspices of the Ontario Forest Industries Association, voluntarily undertook a comprehensive study of the compositions of mill effluents being discharged directly to surface waters in the province. This study is known as the "pre-regulation monitoring program." The purpose of this program was to characterize the wastes from each mill in the province and thereby establish a data base which could be used in the development of a monitoring regulation. The Ministry was supportive of the program and agreed that the data would be used, along with data from other sources, to assist with the development of a regulation.

Industry undertook the sampling and analysis of each mill's effluent four times during 1987. Samples of intake water and final effluent discharge were collected at each mill and analyzed for a broad range of priority and conventional pollutants. In addition, rainbow trout fish bioassays were performed on all effluent samples.

In developing the lists of chemical parameters for analysis, it was important that widely accepted standard analytical protocols were available. For this reason, the USEPA priority pollutants list was used as a basis. The complete list of parameters targeted in the study is shown in Table 5. EMPPL, the Ministry's "environmental monitoring priority pollutants list," was not available when the pre-monitoring commenced.

Five parameters on the EPA list were omitted. Asbestos was omitted because of the unlikelihood of finding the material in pulp and paper mill effluents. The chlorinated dioxin, 2,3,7,8-TCDD, was omitted due to lack of an applicable analytical capability at commercial laboratories for levels likely to be found in pulp and paper mill effluents. Acrolein, acrylonitrile and N-nitrosodimethylamine were omitted as they were not amenable to analysis by available standard analytical procedures routinely used by commercial laboratories. Xylene and mesitylene were included since analytical methods were available. Finally, aluminum was added to the list since aluminum compounds are frequently used in pulp and paper mill operations.

GC/MS "forensic scans," (organic open characterization) consisting of library searches of the volatile, acid and base-neutral extracts from samples collected in rounds 1 and 4 were also carried out.

Later in the year, the Ministry also undertook to sample and analyze effluents from each mill once during the course of the pre-regulation monitoring program. The Ministry's target list of parameters contained the compounds from the EMPPL for which analytical protocols were available. This meant that the list was essentially the same as that of the industry. In addition, the Ministry performed one GC/MS "organic open characterization" on most mill effluents.

Analysis for chlorinated dioxins and dibenzofurans was not carried out by the Ministry due to problems which had been experienced with the analyses for these substances in pulp and paper mill effluents.

In cases where there was more than one effluent discharge point at a mill, Industry elected to combine samples in order to reduce costs. This meant that where a mill had more than one effluent discharge or where two or more contributory streams were normally used to monitor a single effluent, samples from each individual discharge

or contributory stream were not separately analyzed but were combined prior to analysis.

19 mills had single effluent discharges and combined samples were used on the remaining 8.

The Ministry does not condone the use of combined samples because it believes there is a risk that compounds present in any single effluent at levels close to detection may be diluted beyond the method level of detection upon combining with another effluent. Also, chemical reactions could occur between chemicals in the effluents which are combined thereby yielding misleading data.

Notwithstanding these concerns, Industry believed that the data generated by the program adequately characterized the discharges from each mill to its particular receiving body of water and were representative of what would be impacting on the receiver.

The Ministry agreed that the data had merit and agreed that it would be used along with other information in the development of the regulation.

Table 5 is a list of the analytical target parameters covered by the Industry in its pre-regulation monitoring program.

Table 6 indicates the parameters retained and rejected following initial screening of the pre-regulation monitoring data by Industry. The parameters eliminated were those which were not found in any mill effluents during the four rounds of sampling or those which were eliminated by the Industry's initial screening techniques. The two main validation criteria applied by Industry were that average of the reported concentrations from the four rounds of sampling had to be greater than the method detection limit and the values reported for effluent samples had to be at least twice those reported for the intake water.

Table 4., lists those compounds from EMPPL which were positively identified from industry and ministry samples as being present in effluent samples. Maximum, minimum and arithmetic mean values as reported by the OFIA pre-regulation monitoring study, are included.

Table 3., lists those compounds which were tentatively identified by GC/MS "forensic scan " or "organic open characterization ," as being present in the samples analyzed by the Industry and the Ministry. Most of these compounds are not on EMPPL and may not have been screened through the EMPPL process to determine whether they are of concern.

5. ANALYSIS OF PRE-REGULATION MONITORING DATA

TABLE 4, lists by mill category, the EMPPL compounds found at each mill in the pre-regulation monitoring program. As can be readily seen, not many EMPPL compounds were found and only a few were found to be common to all mills or to a mill category. TABLE 4 is based on data generated from the Industry's pre-regulation monitoring sampling program after initial screening and the Ministry's pre-regulation monitoring sampling program. During the initial screening, all parameters which were reported as

non-detectable in mill effluents during all four rounds of sampling were removed from the parameter list. In addition, the nineteen organo-chlorine pesticides were removed during this screening phase for reasons discussed below. Table 6 lists the parameters from the Industry's pre-regulation monitoring data which were eliminated during initial screening and those which remained following the initial screening.

METALS:

A review of Table 4 indicates that a number of metals were detected above the method detection limit. Of these, aluminum, cadmium, copper, chromium, lead and zinc were detected at most mills.

Aluminum was found in all mill effluents, often in the low ppm range. Alum and other aluminum salts are used in paper making processes as conditioners and this use probably accounts for the presence of aluminum in mill effluents. Aluminum is known to be toxic at higher concentrations and in natural waters, concentrations in excess of 0.1 ppm are known to be deleterious to the growth and survival of fish. For these reasons, the regulation writing sub-committee agreed that aluminum was a potential candidate for control and warranted high-frequency monitoring.

Cadmium, copper, and chromium were found in most mill effluents in low concentrations. The sources of these elements are not clearly understood since products containing these elements are not used in mill processes. Although these three elements are known to be present in wood, their concentrations in wood would not be expected to give rise to the levels found in the mill effluents. Their presence is probably more attributable to normal corrosion and erosion of equipment used in the mills. As such, the concentrations of these metals in the effluents would not be expected to vary significantly.

The Ministry's position with respect to these elements was that at the concentrations found, they should probably be candidates for high-frequency monitoring. Industry on the other hand, maintained that although the data indicated a need for further investigation, high frequency monitoring was not warranted. It was finally agreed that monthly monitoring for these elements would suffice to determine whether they were potentially problematical, warranting further investigation under the limits regulation.

Lead was found at all mills in very low concentrations except at one mill where the maximum level detected was 18 ppb. Again, the source of the lead is not clearly understood since lead and lead compounds are not used in pulp and paper operations. It can be postulated that the lead originates from its presence in trees and to a lesser extent, from corrosion or erosion of equipment in the mill. (eg. lead-based solder)

Since the levels in the pre-regulation monitoring data were low and since the levels would not be expected to vary significantly, it was agreed that monthly monitoring for lead would be adequate to determine whether lead was a problem element warranting further investigation under the limits regulation.

Zinc was found in all mill effluents in concentrations as high as 840 ppb although at most mills the level was below 200 ppb. The source of these relatively high

concentrations is not accurately known although there is some evidence to suggest that the zinc originates in the wood used for pulping. No Ontario mills use zinc compounds for pulp brightening although it is possible that zinc compounds may be used in processing.

Since the levels of zinc found in the pre-regulation monitoring program were relatively high compared to the Provincial Water Quality Objective of 30 ppb, it was agreed that zinc was a potential candidate for control and warranted high frequency monitoring.

Other metals were detected at individual mills but concentrations were generally low with the exception of two mills which showed moderately high levels of thallium. The occurrence of these metals in the effluents is probably attributable to the presence of the metals in the raw wood used for pulping. (It is interesting to note that the two mills showing higher levels of thallium are located in Northwestern Ontario.)

These other metals detected in the pre-regulation monitoring program were not considered to be of significance and the regulation writing sub-committee agreed that high-frequency monitoring was not justified. It was agreed that further monitoring of these metals should be conducted as part of the sector characterization requirements.

Mercury, ATG 12, was found in very low concentrations at a number of mills. In general, the levels were below the PWQO of 0.2 ppb with a few results being marginally above. The mercury likely originates from the trees used to produce pulp although there is a possibility that the caustic soda supplied by certain manufacturers which still use mercury cells, contains trace levels of mercury.

Since the levels detected in the pre-regulation monitoring program were low, it was agreed that monthly monitoring for mercury would be adequate to determine whether mercury was a problem warranting further investigation under the limits regulation.

Hydrides, ATG 10, were found in very low concentrations, marginally above the method detection limit. The Industry's pre-regulation monitoring data only detected arsenic but the Ministry's data indicated the presence of antimony or selenium in certain mill effluents. Their occurrence in effluents is most likely attributable to their presence in the wood used for pulping.

Since these elements are not normally associated with pulp and paper manufacturing operations and compounds containing these elements are not used in processing, it was agreed that further monitoring for this analytical group was not warranted.

ORGANICS:

Table 4 indicates that a number of organic compounds from EMPPL were detected but only a few were found to be common to all mills or to mills within a category.

Chloroform was detected at every mill with the largest concentrations being found at the nine kraft mills, all of which have chlorine-based bleaching operations. It is known that chloroform can be produced in bleaching operations that use chlorine

compounds, particularly hypochlorite, and it is also known that chloroform can be produced if raw water is treated with chlorine for disinfection purposes. Most mills treat their raw water with chlorine, particularly during summer months, and this is the most likely source of the chloroform found at the other 18 mills.

Because it was found in every mill effluent and occasionally in high concentrations, the regulation writing sub-committee agreed that chloroform was a probable candidate compound for control and high-frequency monitoring.

Methylene Chloride was found at every mill. It was generally agreed that this finding could be attributed to laboratory contamination since methylene chloride is a common analytical artefact in most laboratories. Methylene chloride is used as a solvent and is known to be present at relatively high background levels in the laboratory environment.

Although reported as present in relatively high concentrations in all mill effluents, because it is a known analytical artefact, the regulation writing sub-committee agreed that there would be little merit in requiring high-frequency monitoring for this compound since the results would be difficult, if not impossible, to interpret.

Three **Phthalate compounds** were found at every mill. It is known that phthalates are used in many plastics as plasticizers and are another analytical artefact, often showing up in laboratory analyses as a result of the use of plastic tubing, containers, etc. As in the case of methylene chloride, it was agreed that there would be little merit in requiring high-frequency monitoring for these compounds.

Toluene appeared in a large number of mill effluents but generally in low concentrations. One mill for which a high concentration of toluene was reported, used the material as a solvent in its processing but this operation is now shut down. The presence in the other mill effluents is difficult to explain other than as a contaminant introduced by laboratory or maintenance operations.

Because this is not a compound normally associated with pulp and paper making operations and because it was detected in very low levels except for the one case already mentioned, the regulation writing sub-committee agreed that toluene would not likely be a candidate for control and therefore, high-frequency monitoring was not warranted.

Phenol was found at most mills. This is one of the more surprising findings of the pre-regulation monitoring program although it is known that phenol can be produced during the chemical pulping of wood. Of the three mills which showed very high levels of phenol, two manufacture corrugating medium using a high percentage of hardwood as furnish and the third is a kraft mill which periodically uses a large percentage of hardwood in its furnish. (It is known that effluents resulting from hardwood pulping are likely to contain more phenol than those resulting from softwood pulping.) Another possible source of phenol in mill effluents is the use of phenol-formaldehyde resins in the manufacture of board and paperboard products.

The regulation writing sub-committee agreed that although the high levels of phenol found at three of the mills were grounds for phenol to be considered a candidate for control and high frequency monitoring, the relatively low levels found at the other mills did not warrant high frequency monitoring for all mills. It was agreed therefore,

that monitoring for phenol should be limited to once per month for all mills.

Total Alkyl Lead, ATG 13, was not analyzed for in the pre-regulation monitoring program. This compound is not associated with pulp and paper operations, being a compound specifically related to the Organic and Petroleum sectors.

Water soluble Volatiles, ATG 18, were not analyzed for in the pre-regulation monitoring program. These compounds are considered to be specific to the organic chemical sector and are not expected to occur in pulp and paper wastes.

Pesticides and Herbicides, ATG's 21 and 22, were detected in Round 1 of the Industry's pre-regulation monitoring program but problems were encountered with the analyses. Following consultation with the Ministry, it was agreed that the analytical protocols for these groups could not be relied upon to identify real pesticides in pulp and paper mill effluents, particularly those pesticides which contain high levels of chlorinated organics. Recognizing that it would be necessary to revise the protocols for their application to pulp and paper mill effluents and also, recognizing that there is no evidence to suggest that these compounds are formed during pulp bleaching or introduced with the raw wood, it was recommended that monitoring for these groups be deferred pending further investigation by the Ministry.

Chlorinated dioxin and dibenzofuran, analyses were not carried out by the Industry or the Ministry during the pre-regulation monitoring program. The protocols for analyzing these compounds in pulp and paper mill effluents were under review following some difficulties encountered in the USEPA /API, "Five Mill Study." Revised protocols were not available from the Ministry before the monitoring program was complete.

Solvent extractables, were not monitored in the pre-regulation monitoring program. Although oil and grease may be present in pulp and paper wastes, there are many other compounds which may also be soluble in the solvent used for the analysis, thereby creating the potential for erroneous interpretation of the results. This test group was not considered appropriate for pulp and paper mill effluents.

PCB's, ATG 27, were not detected in the pre-regulation monitoring program. Although the United States EPA recognized PCB's as a potential contaminant from mills that operated waste paper deinking processes, the manufacture of PCB's and their use in inks has been prohibited in Canada for more than 10 years which means their presence in waste paper is unlikely. Also, studies in Sweden have determined that PCB's are not formed during bleaching operations. These results were as expected, since the chemical structure of the lignin molecule precludes lignin from being a precursor for PCB formation.

Since PCB's are highly regulated in Ontario and may only be stored in closed containers placed in approved containment areas, the potential for finding PCB's in mill effluents is close to zero.

The regulation writing sub-committee agreed that semi-annual monitoring for PCB's would be adequate bearing in mind that no PCB's had been detected in the pre-regulation monitoring program.

CONVENTIONAL MONITORING PARAMETERS

Cyanides were detected at very low levels in the Industry's pre-regulation monitoring program at ten of the mills but were not detected in the remaining 17. Cyanides are not used in pulp and paper processing operations and there is no evidence to suggest that they are formed during processing.

Sulphides were not monitored in the pre-regulation monitoring program although they are known to be present in kraft mill cooking liquors and condensates. Although sulphides are toxic, the literature does not appear to implicate them as contributors to kraft mill effluent toxicity, probably due to the ease with which they are oxidized, particularly by any residual chlorine that may be present.

OPEN CHARACTERIZATIONS:

Table 3 indicates the chemical compounds or compound groups tentatively identified by the "open organic scans" performed by the Industry and the Ministry during the pre-regulation monitoring program. As can be seen, the list is rather large and none of the compounds detected appear on EMPPL.

EMPPL represents the list of toxic contaminants which have been screened to-date by the Ministry and found to be of concern. Of the total list, analytical protocols exist for about only 140 compounds and, for the most part, protocols do not exist for compounds not on the list. The lack of a protocol means that it is not possible to conduct acceptable qualitative analysis under the MISA monitoring program.

Compounds tentatively identified in the open scan data will be screened through the EMPPL screening process to determine whether they are of concern. Where concerns are identified, it will be necessary to positively identify the presence of the specific compound by more detailed analysis and then develop analytical protocols. Protocol development normally takes about one year to complete and new compounds may be added to EMPPL provided protocols are developed before the regulation is promulgated. If protocols are not developed before promulgation of the regulation, monitoring for these compounds may be required later under a limits regulation.

6. SAMPLING AND FLOW MEASUREMENT

In mid-1987, the Ministry at the recommendation of the Joint Technical Committee, commissioned the consulting firm, "CANVIRO", to undertake a study to review the adequacy of existing flow measurement and sampling equipment at each of the 27 mills. The report, "Flow Measurement and Sampling Study for the Pulp and Paper Sector in Ontario," was tabled before the JTC in March of 1988. As well as documenting the flow measurement and sampling devices, the report also documented the number and types of the major effluent streams at each mill.

For the purpose of the regulation development, the information contained in the "CANVIRO" report was used in combination with the Industry's knowledge of individual mills to characterize the number and types of effluent streams which would require monitoring. In most cases, the effluent streams, the sampling locations and the flow

measurement locations identified for monitoring purposes were the same as those presently in use at the mills. Some mills, however, have indicated in writing their intention to make changes to certain monitoring stations as a result of decisions to combine multiple outfalls into a single outfall or to install new flow measurement and sampling devices.

Recognizing that these changes would not likely be forthcoming before the regulation was promulgated, it was decided to develop a regulation which would be general, covering the types of effluent to be monitored and the monitoring parameters required for each type of effluent. By doing this, amendments to the regulation in the future as monitoring stations are changed, will be avoided.

The sampling points identified for the effluent streams at each mill were examined to determine whether they would yield information necessary to characterize the operations at the mill. Special attention was paid to those mills which operated more than one pulping process.

In the case of mills operating both sulphite and mechanical pulping, it was not considered necessary to differentiate between the effluents from both operations since the concerns with both types of operation are similar. BOD5 and toxicity due to resin and fatty acids are the main areas of concern for these mills.

At one kraft mill, the Ministry has agreed to allow the mill to take separate samples from the acid and alkaline sewers and combine them into a single sample for the purposes of the monitoring regulation. The two streams do subsequently combine in a channel prior to discharge to the receiver and it is known that the combined stream exhibits different characteristics from those of the individual streams.

The Ministry is requiring the monitoring of cooling water streams. Cooling water streams are identified in the "CANVIRO" report even though many of them are not routinely monitored under current Ministry requirements. Also, monitoring is being required for backwash effluents from intake water treatment plants, emergency overflow discharges and any continuous effluents from waste disposal sites. These discharges were not identified in the CANVIRO report but such discharges are known to occur.

Limited stormwater monitoring is being required at most mills. Since the purpose of the stormwater monitoring is to obtain a preliminary assessment of the impact potential of stormwater discharges on surface waters, twice yearly sampling is recommended for those point source discharges selected for monitoring at the mills. This frequency will provide an industry-wide data base of 110 samples.

The report, "A Survey Of Stormwater Runoff At Ontario Pulp And Paper Mills," prepared by Beak Consultants Limited, provided information on the point and non-point stormwater discharges at each mill in Ontario. This information was not previously known to the Ministry and the report proved to be very valuable in forming the basis for stormwater monitoring requirements. The report categorized the stormwater discharges and rated each one on the basis of the land uses of the respective catchment areas. Based on the ratings, the regulation writing sub-committee agreed that stormwater discharges which originated from catchment areas having the following land uses should be monitored:

- bark storage
- bulk storage and unloading
- chip storage
- coal storage
- waste disposal sites
- waste paper storage
- wood storage.

Using this criterion, 55 point source discharge points were identified for monitoring. These 55 discharge points are located at 19 of the mills. The remaining 8 mills are not being required to monitor any stormwater discharges.

7. FREQUENCY OF SAMPLING

To assist with the selection of the frequencies with which samples should be collected under the monitoring regulation, the Ministry consulted its own statistician and reviewed practices in other jurisdictions, most notably, the US Environmental Protection Agency.

The number of samples needed to estimate the average concentration of a parameter to within some prescribed accuracy can be determined if some statistical measures are known, specifically the variability of the data or the coefficient of variation, and an acceptable relative error in the estimate of the mean.

At the beginning of a new sampling program a reliable value for the variance or the coefficient of variation is not available and because of the lack of historical data the variance or the coefficient of variation may have to be estimated using best judgement.

If we assume the data generated by the sampling program will be approximately normally distributed and the variance is not known with assurance, the " Student's t " distribution may be used in place of the standard normal distribution.

In determining an acceptable frequency of sampling, some knowledge of the expected variability and acceptable relative error in the estimate of the mean is required. Such information was not available for the chemicals or parameters of interest and, therefore, the Ministry had to make certain assumptions. It was assumed that a relative error of 25% in the estimate of a mean would be acceptable at a 95% significance level and that a value in the range of 0.40 to 0.50 for the coefficient of variation could be assumed for a moderately variable parameter. This resulted in a sample size in the range of 12 to 15 as being necessary to estimate a mean within the 25% error range.

Recognizing that the cost of monitoring per event would be relatively high, a value of twelve was taken for the sample size. Increasing the sample size to fifteen, for example, would not likely yield a sufficient increase in the precision to justify the projected increase in costs. In general, therefore, for the purposes of monitoring, the minimum number of samples which should be collected is twelve.

Applying this twelve sample requirement to an adequate data base on which limits can be formulated, leads to the following:

- a) limits regulations formulated on the basis of monthly compliance require a data base with a minimum of twelve data points per month - ie. thrice weekly or daily sampling;
- b) limits regulations formulated on the basis of quarterly compliance require a data base with a minimum of twelve data points per quarter - ie. weekly sampling; and
- c) limits regulations formulated on the basis of annual compliance require a data base with a minimum of twelve data points per year - ie. monthly sampling.

8. DEVELOPMENT OF THE SECTOR CHARACTERIZATION LIST

The Sector Characterization list was developed on the basis of the analysis of the pre-regulation monitoring data and best practicable judgement on the part of the regulation writing team. The list comprises the majority of the compounds on EMPPL. Within ATG 19, the requirement is to analyze only as far as "pyrene" since the balance of the compounds in this test group are not normally associated with pulp and paper manufacturing.

The analytical test groups included in the list are:

Total metals	ATG 9
Mercury	ATG 12
Sulphide (kraft only)	ATG 15
Halogenated volatiles	ATG 16
Non-halogenated volatiles	ATG 17
Base neutral extractables	ATG 19
Acid extractables	ATG 20
Neutral extractables	ATG 23
Resin and Fatty Acids	ATG 26

Analytical test Groups Omitted From The Sector Characterization list

Total Cyanide, ATG 2

Cyanides were detected at very low levels at some mills in the pre-regulation monitoring program. Because the levels were so low and because cyanides are not used or produced in pulp and paper making operations, the regulation writing sub-committee agreed that further monitoring should not be required.

Hydrides, ATG 10

This class of compounds is not normally associated with pulp and paper manufacturing operations although hydrides were found at a number of mills in trace concentrations. Also, although the Industry only analyzed for arsenic in its pre-

concentrations. Also, although the Industry only analyzed for arsenic in its pre-regulation monitoring program, in no case was the concentration in the effluent greater than that detected in the intake water.

Since this class of compounds is not normally associated with pulp and paper manufacturing and since only trace levels were found in the pre-regulation monitoring program, the regulation writing sub-committee agreed that further monitoring for this test group was not warranted and that it should be excluded from the list.

Hexavalent chromium, ATG 11

The presence of hexavalent chromium might be expected in cases where chromate compounds are used as rust inhibitors in cooling waters. Also, hexavalent chromium is known to be a potential contaminant of sodium chlorate used in the manufacture of chlorine dioxide at Ontario kraft mills. Since hexavalent chromium is not expected to be present in significant concentrations in mill effluents and will be accounted for in the determination of total chromium under ATG 9, the regulation writing sub-committee agreed that this parameter should be excluded from the list.

Total Alkyl Lead, ATG 13

This class of compounds is specific to the organic chemical and petroleum sectors and is not normally associated with pulp and paper manufacturing operations. For this reason, the regulation writing sub-committee agreed that this parameter should be excluded from the list.

Phenolics, ATG 14

This test is a non-specific test originally developed for the determination of "reactive" phenols in wastewaters and was not used in the pre-regulation monitoring program. The test has limited application to pulp and paper mill effluents because it relies on the formation of a coloured derivative which experiences interference from coloured polymeric compounds present in the effluents. It is known also, that a large number of phenolic constituents in pulp and paper mill effluents are unreactive to 4-amino-antipyrine. The value of the test is questionable, therefore, since it is not possible to know what compounds are being measured by the test or how to interpret the test results.

Because of these concerns with the test, the regulation writing sub-committee agreed that this test group should be excluded from the list.

Water Soluble Volatiles, ATG 18

The compounds in this test group are considered to be specific to the organic chemical sector and were not monitored in the pre-regulation monitoring program.

There is no evidence to suggest that these compounds could be present in pulp and paper mill effluents, nor are they used in pulp and paper manufacturing operations. For these reasons, the regulation writing sub-committee agreed that this test group should be excluded from the list.

Pesticides and Herbicides, ATG's 21 & 22

As mentioned earlier, severe problems were encountered with the analyses for these groups in the pre-regulation monitoring program. The matter is under investigation by the Ministry and if it is resolved before the regulation is promulgated, consideration will be given to including these test groups in the list.

For the present, the regulation writing sub-committee agreed that these groups should be excluded from the list.

Solvent Extractables, ATG 25

This classical test is often used for the determination of mineral hydrocarbons in aqueous samples, commonly referred to as "oil and grease." The test is non-specific, quantifying a group of substances with common solubility in the extraction solvent used and not quantifying an absolute quantity of a specific substance. Pulp and paper mill effluent is a complex matrix containing many organic substances that could become dissolved in the extraction solvent used for the test. Consequently, any intent to apply this test for the sole purpose of determining the possible presence of oil and grease in mill effluents will yield results which are meaningless and potentially misleading.

An acidified mill effluent can potentially contain many types of organic substances which will be soluble in the extraction solvent. Lignin degradation products, wood extractives, (resin and fatty acids) and low molecular weight pulping and bleaching by-products will all dissolve in the solvent in a non-specific and non-predictable manner. This would then lead to the reporting of elevated levels if the intention is to determine the levels of "oil and grease."

A proper determination of hydrocarbons in pulp and paper mill effluent is only possible using component-specific gas chromatographic techniques. For these reasons, the regulation writing sub-committee agreed that this test group should be excluded from the list.

Total Polychlorinated Biphenyls, ATG 27

As mentioned earlier, PCB's were not detected in any effluents tested in the pre-regulation monitoring program.

The regulation writing sub-committee agreed to semi-annual monitoring for PCB's at all mills and therefore, they are excluded from the sector characterization list.

9. PARAMETERS TO BE MONITORED

This section outlines the parameters and the frequency of monitoring that were recommended by the Regulation Writing Sub-Committee and endorsed by the Joint Technical Committee for inclusion in the monitoring regulation.

The selection of parameters and the frequency of monitoring was based on analysis of the pre-regulation monitoring data and the best practical judgement of the regulation writing sub-committee. An attempt was made to arrive at agreement on a set of rules

which could be used to determine the frequency at which specific compounds or groups should be monitored. However, because so few EMPPL compounds were detected in mill effluents in the pre-regulation monitoring program and even fewer were common to all mill effluents, it was not possible to reach agreement on a set of rules. Instead, the committee agreed to deal with each parameter individually, recognizing that the goals and objectives of the MISA monitoring program should not be overlooked.

9.1 PROCESS EFFLUENTS

DAILY MONITORING

This category of monitoring is used for conventional parameters which normally serve as indicators of process variability and which are traditional candidates for limits control.

COD/DOC All mills are being required to analyze for one or other of these two parameters on a daily basis.

These parameters will provide basic information on the daily variability of mill effluents and reflect variability in mill operations. The data base which will be collected may be used to determine whether any useful correlation can be developed between COD, DOC and BOD5. If a correlation can be developed, it could potentially allow the phasing-out of BOD5 as a control parameter.

A large number of mills are already conducting COD or DOC analyses for internal control purposes. The imposition of this requirement therefore, will not represent a major additional cost burden.

Industry may wish to install continuous monitoring for DOC as a cost saving measure which is why it is being provided as an alternative to COD.

Total Suspended Solids (TSS)

Total suspended solids is being required on a daily basis. TSS is a conventional parameter which is of importance in this sector because pulp and paper mill operations generate substantial quantities of suspended solids which must be removed before the effluents are discharged to a watercourse. All mills in Ontario have installed treatment facilities for the removal of suspended solids but the data gathered under the monitoring program will provide a base for the establishment of a regulated limit for this parameter.

Consideration was given to requiring volatile suspended solids but VSS is a parameter more appropriately used in the control of biological treatment processes. Also, since the bulk of the suspended solids generated in this sector comprises wood fibres, VSS information would be of little use. For these reasons, VSS was not included as a daily requirement. It is being required on a weekly basis for those mills which operate biological treatment systems where it will provide an indication of the amounts of biological solids being discharged.

pH This parameter is currently being monitored at most mills under other requirements of the Ministry. It is a conventional parameter and is useful in providing basic information on the variability of mill effluents and reflects variability in mill operations, particularly with respect to spills and plant upsets.

Specific Conductance

This parameter will be used in conjunction with BOD5 and pH data to provide basic information on the variability of mill effluents and the frequency of spills and plant upsets.

THRICE WEEKLY MONITORING

BOD5 This parameter is a conventional parameter which has been monitored in this sector for years. It provides a measure of the amount of biodegradable organic material being discharged in a mill effluent. The BOD5 loading to a receiving watercourse can be correlated with dissolved oxygen levels and is a useful control parameter in cases where the potential exists for oxygen depletion.

This parameter is seen as one for which limits will be established for monthly compliance. Although mills have traditionally monitored this parameter on a daily basis, because COD/DOC is being required on a daily basis the regulation writing sub-committee agreed that thrice weekly monitoring would be adequate to provide sufficient data points for establishing limits.

Resin and Fatty Acids

Resin and Fatty Acids are found at all mills which produce pulp from raw wood. Chlorinated resin and fatty acids are produced in operations which use chlorine or chlorine derivatives to bleach raw wood fibre. Both the non-chlorinated and chlorinated resin and fatty acids are known to be toxic.

The regulation writing sub-committee agreed that resin and fatty acids are a group of chemicals that would likely be candidates for control on a monthly compliance basis. Therefore, kraft, sulphite, mechanical and corrugating mills are being required to monitor for resin and fatty acids on a thrice weekly basis.

To reduce the cost of RFA monitoring, the committee agreed that surrogate compounds would be used for the thrice weekly monitoring but that the total group, ATG 26, would be monitored on a monthly basis. This will be accomplished under the monthly sector characterization.

The surrogate compounds for kraft mills will be dehydroabietic acid (DHA) and dichlorodehydroabietic acid (DCHA). DHA is the most stable of the resin acids, is found in the effluents of all mills which pulp wood and is the compound used for calibrating the analytical equipment. Other resin and fatty acids are less stable and are prone to break down during sample storage.

DCHA is the most stable of the chlorinated resin acids and is considered the most suitable surrogate for the chlorinated compounds.

The surrogate compound for sulphite, mechanical and corrugating mills will be dehydroabietic acid only since none of the mills in these categories use chlorine or chlorine derivatives for bleaching wood fibres.

The technology used to treat resin and fatty acids (biological treatment) is common to all compounds in the group which means that controlling the levels of the surrogates will also ensure reductions in the other acids in the group. It will probably only be necessary, therefore, to establish limits for the surrogate parameters to ensure effective control of the whole group.

Organo-chlorine (AOX)

All nine of the kraft mills bleach at least some of their production using chlorine and chlorine derivatives. The regulation writing sub-committee agreed that AOX would likely be a candidate parameter for control and regulation on a monthly compliance basis. Therefore, the kraft mills are being required to monitor thrice-weekly for AOX .

The alternative to using a surrogate would be to require monitoring for a lengthy list of individual chlorinated compounds. Protocols only exist for a few such compounds and the Ministry would likely encounter difficulties in trying to establish limits on individual organo-chlorine compounds because data on the application of BATEA is not available for most of these compounds. The use of AOX is a more practical approach and will allow limits to be established which will inherently greatly reduce the discharge of individual organo-chlorine compounds

A similar approach is being used in Sweden where limits on the discharge of TOCl (Total Organic Chlorine) have been set. TOCl is a test which was developed in Sweden but is slightly more complex than the AOX test and therefore less desirable for monitoring purposes. The TOCl test also gives a value which is significantly less than that for the AOX test when performed on the same sample.

WEEKLY MONITORING

Total Phosphorus and Nitrogen

These parameters are being required for mills which operate biological treatment systems with the addition of nutrients. Nutrient additions are often necessary for the efficient operation of bio-systems and the discharge of excess nutrients to a receiver could be cause for concern.

Since the concentrations of these parameters are not expected to vary widely, the regulation writing sub-committee agreed that monitoring on a weekly basis was adequate to characterize these parameters.

Volatile Suspended Solids

As discussed earlier, volatile suspended solids is a useful parameter which is often used to differentiate between biological and other suspended solids. In the case of pulp and paper mills, its use for this purpose is somewhat limited because the bulk of the suspended solids discharged by a pulp or paper mill normally comprises wood waste or fibre which will contribute to the level of volatile suspended solids. However, since mills which operate biological systems also have good primary treatment systems which remove the bulk of the suspended solids ahead of the bio-system, the test will potentially provide an indication of the levels of bio-solids being discharged.

The regulation writing sub-committee agreed that weekly monitoring for this parameter would provide an adequate data base to determine whether bio-solids discharges are a significant problem.

Aluminum

As was discussed earlier, aluminum can be highly toxic in certain natural waters and can be deleterious to the growth and survival of fish. For these reasons, the regulation writing sub-committee agreed that aluminum should be a candidate for control and high-frequency monitoring.

In further discussions, it was pointed out by the Industry that the concentrations of aluminum in respective mill effluents would likely not vary significantly because mills tend to use constant dosages of aluminum salts in their manufacturing operations.

The committee finally agreed that weekly monitoring would be acceptable for this parameter. This would produce 52 data points per mill. Also, it can be expected that the data produced for various categories of mills will be able to be lumped together to form an expanded data base for each category if needed.

Zinc

As was discussed earlier, zinc is known to be toxic and to accumulate in aquatic organisms but the concentrations of zinc in respective mill effluents are expected to remain fairly constant.

Using a similar rationale as that used for aluminum, the regulation writing sub-committee agreed that weekly monitoring would be appropriate for this parameter.

MONTHLY MONITORING

Nitrogen and Total Phosphorus

Monitoring of these parameters will provide an indication of nutrient loadings to the receivers. Under the Canada/Ontario Great Lakes Agreement, there is an onus on Ontario to provide data on phosphorus discharges to the Great Lakes.

Recognizing these concerns, the regulation writing sub-committee agreed that monthly monitoring should be conducted at all mills.

Sulphide

Although sulphide was not monitored in the pre-regulation monitoring program, due to its known toxicity and potential presence in kraft mill effluents, the regulation writing sub-committee agreed that monthly monitoring of kraft mills process effluents for sulphide should be required.

Resin and Fatty Acids

As discussed earlier, the regulation writing sub-committee agreed to monthly monitoring for the full range of RFA's in ATG 26 and thrice weekly monitoring of specific surrogate RFA compounds.

Organochlorines (AOX)

The regulation writing sub-committee agreed that AOX monitoring should be required at any mill which uses chlorine or chlorine derivatives for pulp bleaching or brightening. It was agreed that all kraft mills would be required to monitor for AOX thrice weekly but it was felt this would be an excessive requirement for mills which only use chlorine compounds for pulp brightening.

Currently, other than the kraft mills, only one small mill which manufactures fine papers from deinked, recycled paper uses chlorine compounds for brightening. The amount of organochlorines expected from this operation is small.

The regulation writing sub-committee agreed that monthly monitoring would be adequate in this case to determine whether AOX discharges are a potential problem at this type of mill.

Chlorinated Dibenzo-p-dioxins and Dibenzofurans

It is known that these substances can be formed in processes which use chlorine and/or chlorine derivatives to bleach fibre and it is reasonable to assume that they could be found in the effluents of any mill which produces or uses pulps which have been bleached with chlorine or chlorine derivatives.

Ontario has nine kraft mills and one fine paper mill which are currently manufacturing bleached or brightened pulps using chlorine and/or chlorine compounds.

The Ministry initially adopted the position that it would be necessary to conduct a detailed dioxin monitoring program within each kraft mill, particularly around the bleach plant, in order to properly assess the amounts of these compounds which were being generated in each mill. Industry pointed out that it believed such studies were outside the purview of the MISA monitoring program and could only be conducted in a meaningful manner if undertaken as a research project.

Industry also pointed out that the Pulp and Paper Research Institute of Canada is conducting a large scale study into the formation and reduction or elimination of these substances. In excess of \$1 million has been spent to date on this study and the Industry now has a much better understanding of how and where these substances are formed.

On the understanding that the study results would be made available to the Ministry, it was finally agreed that only monitoring of effluent discharges would be required.

Results of the study to date, published in October 1988, indicated that the mechanisms by which chlorinated dioxins and dibenzofurans are formed in mills are now known and that methods for potentially minimizing or preventing their formation have been developed. The industry is now evaluating the application of these methods at actual mills.

After much discussion both inside and outside the regulation writing sub-committee, it was finally agreed that mills which use chlorine or chlorine derivatives for bleaching or brightening would be required to monitor monthly.

Sector Characterization.

The Ministry adopted a position that 12 sector characterizations were necessary to complement the very small list of individual parameters selected for high-frequency monitoring. Industry argued that 12 was excessive because at least five characterizations had been conducted for each mill in the pre-regulation monitoring program.

After considerable discussion both within and outside the committee, the regulation writing sub-committee agreed to a requirement of monthly sector characterizations.

The **sector characterization** includes the following groups:

Total Metals	- ATG 9
Mercury	- ATG 12
Sulphide (kraft only)	- ATG 15
Volatiles, halogenated	- ATG 16
Volatiles, non-halogenated	- ATG 17
Base neutral extractables	- ATG 19
Acid extractables	- ATG 20
Neutral extractables	- ATG 23
Resin and Fatty Acids	- ATG 26

Toxicity

LC50, 96hr, Rainbow Trout and LC50, 48hr Daphnia magna toxicity testing is being required by the Ministry on a monthly basis for all process effluent streams at all mills. This is Ministry policy and was not negotiable.

The rainbow trout testing will provide information on the acute toxicity of the effluents and allow comparison with other historical or reported data.

The Daphnia magna testing will provide information on the suitability of this test as a possible replacement for the rainbow trout test. Daphnia are generally more sensitive and respond more rapidly to toxicants than fish. Also, because of their small size, only small amounts of effluent are required for each test.

In the case of rainbow trout testing, should the results for three consecutive months prove the effluent to be non-lethal, the frequency of testing will be reduced to once every three months, for a total number of 6 tests. This relief will not apply in the case of the Daphnia magna testing.

BI-MONTHLY MONITORING

Chlorinated Dioxins and Dibenzofurans

For mills which continuously use but do not manufacture bleached pulp in their operations, the Ministry adopted a position that dioxin monitoring should be required 12 times per year. The Industry argued that this was an excessive requirement and would be particularly onerous on some of the smaller mills. To support this position, Industry tabled a report before the regulation writing sub-committee which documented that dioxins would not be found in the effluents of most of these mills using the method detection limits currently employed by the Ministry.

The Misa Advisory Committee, in its review of the draft regulation, recommended that the level of testing should be reduced to 6 times per year.

Acting on the advice of the Misa Advisory Committee, the regulation writing sub-committee agreed to testing on a bi-monthly basis.

For those mills which use bleached pulp intermittently, normally under emergency situations to replace other types of pulps, the regulation writing sub-committee agreed that monitoring should be conducted once per month, at a time when the mill is using bleached pulp, for every month in which bleached pulp is used, up to a maximum of six tests.

SEMI-ANNUAL MONITORING

Chlorinated Dioxins and Dibenzofurans

As part of the issue of dioxin monitoring, the regulation writing sub-committee debated the question of the frequency of monitoring for those mills which do not manufacture or use bleached pulp. There is little likelihood of finding dioxins in the effluents of these mills but it was recognized that some monitoring would be required to document their absence.

The regulation writing sub-committee finally agreed that semi-annual monitoring for these mills would be appropriate.

Open characterization

Given that three open characterizations were performed in the pre-regulation monitoring program and that one additional characterization will be performed by the Ministry as part of the Ministry audit program, the regulation writing sub-committee agreed that two open scans should be required.

Inorganic open characterizations (ATG 29) are not being required as they were not considered appropriate for this sector. The testing for metals (ATG 9) being performed under the sector characterization was considered adequate for characterizing pulp and paper mill effluents.

Due to the large number of compounds present in most pulp and paper mill wastes, it can be argued that characterizations can only be considered indicative of some of the compounds present and each test is likely to yield slight differences from the one before. For this reason, performing additional characterizations is unlikely to yield more useful information and would be an unnecessary cost burden on the Sector.

9.2 COOLING WATER EFFLUENTS

MONTHLY MONITORING

The regulation writing sub-committee agreed that testing for COD/DOC, total suspended solids, pH and specific conductance on a monthly basis would be adequate to characterize cooling water effluents and to determine whether they are contaminated with process wastes.

Toxicity testing is being required on all cooling water discharges on a monthly basis as Ministry policy. A mechanism is provided whereby the frequency of toxicity testing may be reduced to quarterly if during the testing, 5 or more of the 10 fish survive at each dilution in each of three consecutive monthly tests.

Where chromium or zinc containing additives are used as corrosion inhibitors or conditioners, there is an additional requirement to monitor for these two metals on a monthly basis.

9.3 WASTE DISPOSAL SITE EFFLUENTS

MONTHLY MONITORING

BOD5, suspended solids, nitrogen, phosphorus and pH are conventional parameters which the regulation writing sub-committee agreed should be required for any leachate which flows continuously from a waste disposal site. Monthly monitoring of these effluents is considered adequate to provide preliminary information on the quality of the discharges from these sites.

Total metals, ATG 9, and mercury, ATG 12, are being required additionally for any waste disposal site which receives chemical sludges or muds resulting from mill operations.

The committee also agreed that Acid extractables, ATG 20, and Resin and Fatty Acids, ATG 26, should be required as part of the monthly monitoring since bark and wood wastes which can give rise to these parameters, are disposed of at these sites.

9.4 BACKWASH EFFLUENTS

MONTHLY MONITORING

The regulation writing sub-committee considered COD/DOC, pH and total suspended solids to be an adequate list of parameters for the monitoring of backwash effluents from mill intake water treatment operations. Monthly monitoring is deemed sufficient to characterize these discharges which primarily contain the suspended solids removed in the treatment operations.

Where aluminum salts (alum) are used to enhance the removal of solids or turbidity from the intake water, the committee considered that monitoring for aluminum (ATG 9) should also be required.

9.5 EMERGENCY OVERFLOW EFFLUENTS

PER EVENT

From its knowledge of the industry, the regulation writing sub-committee acknowledged that emergency overflows are part of the day-to-day operations at most mills. In many cases, however, emergency overflows are conveyed into process sewers and will be monitored as part of the process effluent. The committee agreed, therefore, that this section of the regulation should only deal with those emergency overflows that would not be monitored by other requirements of the regulation.

Emergency overflows are defined as those overflows which bypass any treatment system prior to discharge to a surface watercourse and the committee agreed that monitoring for COD/DOC, pH, specific conductivity and total suspended solids would be appropriate to determine whether further investigation of these streams would be warranted under the limits regulation.

Requiring the mills to monitor for additional parameters was considered. As most emergency overflows are of short duration or can be expected to contain the same compounds as process effluents, more detailed characterization at this time was considered unnecessary.

9.6 STORMWATER EFFLUENTS

SEMI-ANNUALLY

Stormwater monitoring is being required on a limited basis at a number of mills.

The "CANVIRO" report identified nearly forty separate point-source, stormwater discharges and the Industry reported in excess of fifty. To obtain a more accurate picture of the stormwater discharges a consultant was retained by the JTC to review the stormwater discharges at each mill, classify and rate the discharges according to their potential impact on the environment and to make recommendations with respect to which discharge points should be monitored.

The consulting firm, Beak Consultants Ltd, submitted its report in November 1988. The report indicated a total of 247 stormwater discharges at the 27 mills in Ontario. Of that total, 139 are point sources discharging directly to surface watercourses either through closed pipes or open channels and the remaining 108 are non-point, diffuse discharges.

It is interesting to note that although there are a large number of discharge points, the stormwater contribution to the total effluent discharged from the industry is relatively small. The estimated annual volume of stormwater discharged from all 27 mills, (point sources, diffuse sources and stormwater entering mill process effluent sewers) is less than 1% of the annual volume of effluent discharged by the 27 mills. Further, the estimated annual volume of stormwater discharged directly to surface watercourses that may contain parameters of concern, (based on the consultant's assessment) is less than 0.5% of the annual volume of effluent.

Stormwater runs off a variety of catchment areas on mill sites. Of the catchment areas identified by the consultant, the most likely to have stormwater that may contain parameters of concern and for which monitoring is recommended are the following landuse types:

- | | |
|---------------------|------------------|
| * storage/unloading | * waste paper |
| * wood storage | * disposal sites |
| * chip storage | * bark storage |
| * coal storage | |

The regulation writing sub-committee, based on recommendations of the Strom water sub-committee, recommended that monitoring be required only for point source discharges as sampling and flow estimation for diffuse sources is extremely difficult. In addition, where a mill has more than one catchment area which is used for the storage of wood, chips, bark, waste paper or coal, the committee recommended that the mill only be required to monitor the largest of the catchment areas for each land use category. Monitoring is being required at a total of 55 point source discharges among 19 mills. Grab samples are recommended.

Schedule A, subsection 9, indicates the recommended analytical parameters for each land use category. These parameters were developed largely on the basis of the Beak report and additional concerns that were expressed by the Ministry to the committee.

10. **QUALITY ASSURANCE/QUALITY CONTROL**

Quality assurance and quality control (QA/QC) encompass all of the procedures undertaken to ensure that the data produced are generated within known probability limits of accuracy and precision.

Quality assurance is the overall verification program which provides producers and users of data the assurance that predefined levels of confidence are met. Quality assurance comprises two elements: quality control and quality assessment.

Quality control is the overall system of guidelines, procedures and practices which are designed to regulate and control the quality of products or services to comply with previously established performance criteria and standards.

Quality assessment is the overall system of activities which ensure that quality control is being performed effectively. This is carried out immediately following quality control and involves evaluation and auditing of quality control data to ensure the success of the quality control program.

QA/QC is one of the most important aspects of the MISA monitoring regulations. The QA/QC program includes many of the small but essential activities ranging from proving the cleanliness of sample bottles, using proper sampling equipment, containers and preservatives, calibrating instruments, validating the authenticity of standards, through to documenting performance. Omission of one of these activities can lead to unreliable data resulting in improper conclusions and perhaps inappropriate actions.

In order to verify the procedures being used, all mills will be required to run a number of quality control samples in addition to the regular samples. Details of these additional requirements are set forth in Sections 23 to 26, inclusive.

11. ECONOMIC CONSIDERATIONS

COST OF MONITORING

Detailed estimates of the capital and operating and maintenance (O & M) costs associated with the five primary monitoring functions and their financial implications are presented in the MOE's Policy and Planning Branch report "Monitoring Costs and Their Implications for Ontario's Pulp and Paper Sector (February 1989)."

The five primary monitoring functions specified in the Regulation are sampling, flow measurement, chemical analysis, toxicity testing and the reporting of data. In addition, the costs associated with the transportation of samples from the mills to labs located in either Toronto or Montreal were estimated.

Table 11.1 provides a summary of total capital and O & M costs for each monitoring function.

TABLE 11.1
SUMMARY OF CAPITAL AND OPERATING AND MAINTENANCE COSTS
BY MONITORING FUNCTION (\$1,000's)

MONITORING FUNCTION	CAPITAL COSTS	O & M COSTS	TOTAL	
			\$	%
Sampling	\$817.70	\$1,260.50	\$2,078.20	22.52%
Transportation		\$155.10	\$155.10	1.68%
Flow measurement	\$2,798.50	\$27.30	\$2,825.80	30.62%
Routine analysis		\$3,381.00	\$3,381.00	36.63%
Toxicity testing		\$302.40	\$302.40	3.28%
Reporting	\$206.60	\$280.90	\$487.50	5.28%
TOTALS:	\$3,822.80	\$5,407.20	\$9,230.00	100.00%

Flow measurement installations account for almost \$3 million of the total \$3.8 million total capital cost estimate while chemical analyses accounts for \$3.4 million of the total \$5.4 million O & M cost estimate. The actual capital and O & M costs may vary by $\pm 25\%$ and $\pm 15\%$ respectively, because of uncertainties and contingencies.

The capital and O & M costs among each of the four mill sub-categories is shown in Table 11.2. Clearly, the kraft mills bear the largest share of the total \$9.2 million estimated cost associated with the MISA monitoring requirements. This is mainly due to the fact that the analytical requirements are more extensive and rigorous for the kraft mills than the remaining mills. Total monitoring costs for each mill range from \$132,350 to \$1,517,300.

TABLE 11.2
SUMMARY OF CAPITAL AND OPERATING AND MAINTENANCE COSTS
BY MILL SUB-CATEGORY (\$1,000's)

MONITORING FUNCTION	CAPITAL COSTS	O & M COSTS	TOTAL	
			\$	%
Kraft	\$2,360.40	\$2,280.20	\$4,640.60	1534.59%
Sulphite - Mechanical	\$738.40	\$1,344.90	\$2,083.30	688.92%
Corrugating	315.3	\$489.60	\$804.90	266.17%
Deinking-Board-Fin Paper	\$408.70	\$1,292.60	\$1,701.30	562.60%
TOTALS:	\$3,822.80	\$5,407.30	\$9,230.10	3052.28%

Table 7 provides a summary of the estimated analytical costs for samples from each of the various effluent streams potentially to be monitored at each mill. Included also is an estimate of the projected total analytical costs for each mill. These estimates are based on current knowledge of the number of effluent streams at each mill which will have to be monitored. The exact number will not be known until mills submit accurate information in the initial report.

Because the number of discharge points varies from mill to mill, costs are not necessarily in proportion to the size of the mill or production levels. Small mills with a large number of discharge points are faced with a disproportionate cost relative to large mills with a single discharge.

Estimates of the total cost for chemical analysis and toxicity testing at individual mills, range from a low of approximately \$83,000.00 to a high of approximately \$296,000.00. The average cost per mill is calculated at about \$134,000.00. The total cost for chemical analysis and toxicity testing for the sector is estimated at \$3.6 million.

For mills in Northern Ontario, samples will most likely have to be transported to the Toronto area, to Montreal or to Winnipeg for analysis because laboratory capability for most of the analytical requirements does not exist locally. Transportation costs for these mills will likely be high.

As discussed in Section 7, the monitoring program is based on generating sufficient data for the development of the Limits Regulation. The estimated cost of chemical analysis was compared to costs that would have resulted from an alternative monitoring program requiring more frequent testing of process effluent streams. If, for the purposes of comparing an alternative sampling program, analyses required on a thrice weekly basis were assumed to be required on a daily basis and analyses required on a weekly basis were assumed to be required on a thrice weekly basis, the total cost of chemical analyses would be more than double the original cost. This provides an indication that costs were taken into consideration when developing the frequency of chemical analyses.

Table 8 indicates the costs for individual analytical tests used in calculating the total analytical costs for each type of process effluent, a cooling water effluent, a waste disposal site effluent, a backwash effluent, an emergency overflow effluent and each type of point source storm water effluent.

These costs were developed by the MOE Laboratories after contacting a number of

These costs were developed by the MOE Laboratories after contacting a number of commercial facilities. They are believed to reflect a reasonable average commercial cost. Mills may elect to perform some of the analyses in their own laboratories, presumably at lower cost.

FINANCIAL IMPLICATIONS

To provide an indication of the implication of the potential capital needs, estimates of incremental capital costs for monitoring were taken as a percentage of average capital expenditures since 1981. The results range from 0.1% to 1.5% with the majority of the firms less than 0.8%.

Estimates of incremental O & M costs for monitoring were taken as a percentage of average after-tax earnings since 1981 to provide an indication of their impact on profits. Apart from one firm, for which long-term data were not available, these figures range from 0.2% to 3.1%.

Another measure of the impact of O & M costs for monitoring is their impacts on the rates of return on capital employed. For all but the one firm mentioned above, the difference in average rate of return since 1981 is less than 0.1%.

It is recognized that the pulp and paper industry is quite cyclical and is very sensitive to national and international business conditions. The industry is currently riding the crest of the economic recovery. The Canadian Pulp and Paper Association (CPPA) reports that Canadian newsprint mills operated at 99% of capacity in 1988, surpassing the 1987 level of 98%. Operating rates in 1988 for wood pulp and paperboard production, respectively at 95% and 97% of capacity, were slightly below the rates for 1987. The CPPA also reported that the total production of paper and paperboard exceeded 16.6 million metric tons (tonnes) for 1988, representing a 3.7% increase over 1987 and 9.0% increase over 1986.

Pulp and paper companies are generally experiencing record levels of earnings at present and healthy rates of return on assets and investments. Forecasts for the pulp and paper industry in 1989 suggest that it will be another good year, although perhaps not a banner year like the previous two. The recent appreciation of the Canadian dollar, relative to the U.S. dollar, is likely to repress profits in 1989. As new production capacity comes on stream in 1990 and beyond, prices and profits are likely to be reduced further.

Based on current financial health and short-run prospects of the industry and financial statistics of the individual firms for which data are available, there is no indication that the incremental costs of the MISA monitoring programme will impose significant burdens on the financial capabilities of firms in the pulp and paper sector.

APPENDIX 1

SUMMARY DATA OF ONTARIO MILLS

Name: ABITIBI-PRICE INC., FORT WILLIAM DIVISION, THUNDER BAY

History: The mill was originally established in 1922 as a groundwood mill. Subsequently, a sulphite mill was constructed which operated until the end of 1981 when it was replaced with a chemi-mechanical pulping process.

Manufacturing Summary: Groundwood pulping
Chemi-mechanical pulping
Paper making

Mill Employees: 300

Production: 235 tonne/day groundwood pulp
135 tonne/day chem-mechanical pulp

Saleable product: 383 tonne/day Newsprint

Effluent Treatment: Primary:

Woodroom effluent: Clarifier followed by settling pond
Final mill effluent: 3 settling ponds

Effluent Discharge: 14,160 m³/day to Thunder Bay, Lake Superior

Name: ABITIBI-PRICE INC., IROQUOIS FALLS DIVISION, IROQUOIS FALLS

History: This mill is the largest Abitibi-Price newsprint mill in Ontario. The mill was constructed in 1914-15 in conjunction with a series of three hydro-electric generating stations on the Abitibi River. The mill operates a high yield sulphite pulping process (without recovery) and produces groundwood pulp.

Manufacturing Summary: Groundwood pulping
Sulphite pulping
Paper Making

Mill Employees: 1000

Production: 620 tonne/day groundwood pulp
205 tonne/day sulphite pulp

Saleable product: 825 tonne/day Newsprint

Effluent Treatment: Primary:

Final mill effluent: 2 clarifiers in parallel

Effluent Discharge: 53,300 m³/day to Abitibi River.

Name: ABITIBI-PRICE INC., THUNDER BAY DIVISION, THUNDER BAY

History: The mill is located in Thunder Bay and was established in 1926. It currently operates a high yield sulphite pulping process and produces groundwood pulp.

Manufacturing Summary: Groundwood pulping
Sulphite pulping
Paper making

Mill Employees: 325

Production: 320 tonne/day groundwood pulp
120 tonne/day sulphite pulp

Saleable product: 442 tonne/day Newsprint

Effluent Treatment: Primary:

Woodroom: Clarifier
Final mill effluent: 2 settling lagoons

Effluent Discharge: 35,000 m3/day to Thunder Bay, Lake Superior.

Name: ABITIBI-PRICE INC., PROVINCIAL PAPERS DIVISION, THUNDER BAY

History: The mill is located in Thunder Bay and was originally constructed as a sulphite mill in 1919. In 1922 the mill began its first paper production and later, groundwood pulp production was added. In 1978 the sulphite pulping process was shut down and the mill now purchases market pulps to provide furnish.

Manufacturing Summary: Groundwood pulping
Paper making

Mill Employees: 250

Production: 125 tonne/day groundwood pulp

Saleable product: 442 tonne/day fine and coated papers

Effluent Treatment: Primary:

Woodroom effluent: Clarifier
Mill effluent: Settling Pond

Effluent Discharge: 47,000 m3/day to Thunder Bay, Lake Superior.

Name: BEAVERWOOD FIBRE CO. LTD., THOROLD

History: The mill was established in Thorold in 1913, producing a variety of board and paper products. Prior to 1976 the mill produced groundwood pulp and purchased market pulp and waste paper products to manufacture newsprint and board. The mill now uses 100% purchased recycled waste paper and board as feedstock and no longer manufactures newsprint.

Manufacturing Summary: Waste paper and board pulping
Paperboard formation

Mill Employees: 160

Saleable product: 273 tonne/day paperboard

Effluent Treatment: Primary:
Final mill effluent: Clarifier and emergency spill pond.

Effluent Discharge: 14,000 m³/day to Old Welland Canal

Name: BOISE CASCADE CANADA LTD., FORT FRANCES

History: The mill was established in 1914 as a groundwood mill. In 1971 a kraft mill was added.

Manufacturing Summary: Kraft pulping
Pulp bleaching
Groundwood pulping
Paper making
Market pulp production

Mill Employees: 1000

Production: 600 tonne/day Groundwood pulp
500 tonne/day Bleached Kraft pulp

Saleable product: 660 tonne/day Groundwood specialty
440 tonne/day Market bleached kraft pulp.

Effluent Treatment: Primary:
Paper mill effluent: Clarifier
Woodroom effluent: Clarifier
Final mill effluent: 2 settling lagoons

Secondary:

Final mill effluent: Aerated lagoon

Effluent Discharge: 93,000 m³/day to Rainy River

Name: BOISE CASCADE CANADA LTD., KENORA

History: The mill located in the town of Kenora was established in 1924. The mill operates a high yield sulphite pulping process (without recovery) and produces groundwood pulp.

Manufacturing Summary: Groundwood pulping
Sulphite pulping
Paper making

Mill Employees: 850

Production: 575 tonne/day groundwood pulp
245 tonne/day sulphite pulp

Saleable product 700 tonne/day newsprint
100 tonne/day groundwood specialty

Effluent Treatment: Primary:
Woodroom and mill effluent: Clarifier

Effluent Discharge: 48,800 m3/day to Winnipeg River

Name: CANADIAN PACIFIC FOREST PRODUCTS LTD, DRYDEN

History: Located in Dryden, the company, originally Dryden Timber and Power Company, was formed in 1910. Production of kraft pulp and sheathing began in 1913. In 1979, Great lakes Forest Products Ltd. purchased the mill and undertook a major modernization and expansion program which included up-to-date pollution abatement measures. Formally known as Great Lakes Forest Products Ltd..

Manufacturing Summary: Kraft pulping
Pulp bleaching
Paper making

Mill Employees: 1030

Saleable product: 670 tonne/day bleached kraft pulp
286 tonne/day fine papers

Effluent Treatment: Primary:
Mill effluent: Clarifier and spill pond

Secondary:

Mill effluent: aerated lagoon followed by settling pond

Effluent Discharge: 84,000 m3/day to Wabigoon River.

Name: CANADIAN PACIFIC FOREST PRODUCTS LTD., THUNDER BAY

History: The mill is located in Thunder Bay and began operation in 1924 as a groundwood mill. A newsprint mill was constructed in 1927 and a sulphite mill was added in 1936. In 1966, a kraft mill was constructed followed by a second kraft mill in 1976. Spent sulphite liquors from the sulphite mill are recovered in the kraft mill recovery system. Formally known as Great Lakes Forest Products Ltd..

Manufacturing Summary: Kraft pulping
Pulp bleaching
Groundwood pulping
Sulphite pulping
Paper making

Mill Employees: 1033

Production: 910 tonne/day Groundwood pulp
300 tonne/day Sulphite pulp
1300 a.d. tonne/day Bleached kraft pulp
1170 tonne/day Newsprint

Effluent Treatment: Primary:
News mill effluent: 2 Clarifiers
Kraft mill effluent: 2 Clarifiers

Effluent Discharge: 222,000 m³/day to Kamanistikwia River.

Name: DOMTAR INC., FINE PAPERS DIVISION, CORNWALL

History: The mill was established in 1883 as a groundwood mill. In 1888 the mill added a sulphite pulping operation. A soda pulp mill was added in 1927 but was converted to a kraft mill in the 1940's. The sulphite and groundwood mills were shut down in the 1970's. The mill purchases market pulps to supplement its furnish.

Manufacturing Summary: Kraft pulping
Pulp bleaching
Paper making

Mill Employees: 1450

Production: 400 tonne/day Bleached kraft pulp

Saleable product: 200 tonne/day Paperboard
600 tonne/day Fine paper

Effluent Treatment: Primary:
Mill main effluent: Clarifier

Effluent Discharge: 102,400 m3/d to St. Lawrence River

Name: DOMTAR INC., CONTAINERBOARD DIVISION, RED ROCK

History: The mill was built in 1945 as a sulphite mill and was converted to a kraft mill in 1959. In 1961, the mill was purchased by Domtar Inc.. The mill was expanded and renovated in 1970.

Manufacturing Summary: Kraft pulping
Pulp bleaching
Groundwood pulping
Paper making

Mill Employees: 650

Production: 600 tonne/day Kraft pulp
150 tonne/day Groundwood pulp
50 tonne/day Semi-bleached kraft pulp

Saleable Product 600 tonne/day Linerboard
200 tonne/day Newsprint

Effluent Treatment: Primary:
Mill effluent: Clarifier and spill pond

Effluent Discharge: 91,000 m3/day to Nipigon Bay, Lake Superior

Name: DOMTAR INC., FINE PAPERS DIVISION, ST. CATHARINES

History: A mill was first established at this site in 1878. Today the mill no longer produces pulp but manufactures fine papers from purchased pulps and recycled clean waste paper.

Manufacturing Summary: Repulping
Paper making

Mill Employees: 500

Saleable product: 200 tonne/day fine paper

Effluent Treatment:

Primary:

Mill effluent: Clarifier

Effluent Discharge:

9,752 m3/day to Old Welland Canal

Name: DOMTAR INC., CONTAINERBOARD DIVISION, TRENTON

History:

The mill was established in Trenton in 1926. Originally the mill produced soda pulp from cereal straws but in 1951 this process was replaced with a neutral sulphite semi-chemical process for pulping wood. In the 1970's, the mill was modernized and the NSSC process was converted to caustic semi-chemical pulping which eliminated the use of sulphur. Waste pulping liquors are collected and sold for use as a dust suppressant. The mill also processes recycled waste corrugating medium and board.

Manufacturing Summary:

Semi-chemical pulping
Board making

Mill Employees:

140

Production:

130 tonne/day semi-chemical pulp

Saleable product:

282 tonne/day Corrugating medium

Effluent Treatment:

Recovery and reuse of spent pulping liquors.

Effluent Discharge:

3,700 m3/day to Trent River

Name: E.B. EDDY FOREST PRODUCTS LTD., ESPANOLA

History:

The mill started operation in 1902 as a groundwood pulp mill. In 1936, the mill was closed down and did not reopen until 1946 when a new kraft mill was constructed. The groundwood mill was shut down in 1966. In the late 1970's, the mill underwent a modernization program which included the installation of an oxygen delignification process and the installation of secondary effluent treatment.

Manufacturing Summary:

Kraft pulping
Pulp bleaching
Paper making

Mill Employees:

940

Saleable Product:

900 tonne/day Bleached kraft pulp
120 tonne/day Kraft specialty paper
20 tonne/day Fine papers

Effluent Treatment: Primary:
Woodroom effluent: Settling Lagoon
Paper mill effluent: 2 clarifiers
Secondary:
Final mill effluent: aerated lagoon
Effluent Discharge: 117,600 m³/day to the Spanish River.

Name: E.B. EDDY FOREST PRODUCTS LTD., OTTAWA

History: The mill commenced operations in 1905 producing a variety of paper and board products. In 1979, the paperboard mill was shut down and the mill currently produces fine papers. The mill is essentially integrated with the E.B. Eddy pulp mill in Hull, Quebec which lies across the Ottawa River.

Manufacturing Summary: Paper making
Mill Employees: 600
Production: 200 tonne/day Fine papers
Effluent Treatment: Primary:
Mill effluent: Clarifier
Effluent Discharge: 7,950 m³/day to Ottawa River

Name: FRASER INC., THOROLD

History: The mill was established in Thorold in 1903. It now manufactures fine papers from deinked recycled waste paper and purchased pulps. In the 1970's, the mill installed a high-rate biological oxidation system to treat the effluent from the deinking plant.

Manufacturing Summary: Waste paper deinking
Paper making
Mill Employees: 625
Saleable Product: 270 tonne/day Fine papers
Effluent Treatment: Primary:
Final Effluent: Clarifier

Secondary:

Final effluent: High-rate biological oxidation followed by Clarifier

Effluent Discharge: 25,300 m³/day to Old Welland Canal

Name: JAMES RIVER MARATHON LIMITED, MARATHON

History: The mill was constructed as a kraft mill in 1945. In the late 1970's, the mill embarked on a modernization program and in 1984 installed a foam retention lagoon and a diffuser outfall into Lake Superior which eliminated a long-standing aesthetic problem associated with the mill's discharge.

Manufacturing Summary: Kraft pulping
Pulp bleaching

Mill Employees: 600

Production: 440 tonne/day Bleached kraft pulp

Effluent Treatment: Primary:
Mill effluent: Clarifier
Final mill effluent: Diffuser outfall

Effluent Discharge: 64,530 m³/day to Lake Superior

Name: KIMBERLY CLARK OF CANADA LTD., HUNTSVILLE

History: The mill was constructed in March 1971 and uses purchased bleached kraft pulp to manufacture tissue. It is the largest tissue mill in Canada.

Manufacturing Summary: Paper making (Tissue)

Mill Employees: 70

Production: 95 tonne/day Tissue

Effluent Treatment: Primary:
Mill effluent: Clarifier, polishing basins and percolating bed in winter or spray irrigation in the summer.

Effluent Discharge: 425 m³/day to Muskoka River

Name: KIMBERLY CLARK OF CANADA LTD., ST. CATHARINES

History: The mill dates back to 1912 when it was constructed as a groundwood mill. The mill uses purchased pulps to produce tissue, crepe paper and fine paper products.

Manufacturing Summary: Paper making

Mill Employees: 200

Production: 50 tonne/day Tissue
35 tonne/day Crepe
12 tonne/day Fine papers

Effluent Treatment: Primary:

Final mill effluent: Clarifier followed by detention basin

Effluent Discharge: 10,066 m3/day to Old Welland Canal

Name: KIMBERLY CLARK OF CANADA LTD., TERRACE BAY

History: The mill was constructed in 1948 as a small (320 tonne per day) kraft mill. Over the years, production was steadily increased and in 1978, a new second kraft pulping mill was added. In 1981, a fire occurred at the mill and during subsequent reconstruction, several new process changes were incorporated. The mill is presently constructing an aerated lagoon to treat the final mill effluent.

Manufacturing Summary: Kraft pulping
Pulp bleaching

Mill Employees: 1125

Production: 1200 tonne/day bleached kraft pulp

Effluent Treatment: Primary:

Mill main effluent: 2 clarifiers

Secondary:

Aerated lagoon (under construction)

Effluent Discharge: 121,120 m3/day to Moberly Bay, Lake Superior

Name: MACMILLAN-BLOEDEL LIMITED, STURGEON FALLS DIVISION, STURGEON FALLS

History: The mill dates back to 1900 and operated from then until 1930 when it was shut down. In 1948, the mill was reopened and began production of hardboard (Masonite) and corrugating medium using the neutral sulphite semi-chemical pulping process. Waste pulping liquors are not recovered.

Manufacturing Summary: NSSC pulping
Mechanical pulping
Paperboard formation
Hardboard sheet formation

Mill Employees: 420

Production: 200 tonne/day NSSC pulp
110 tonne/day mechanical pulp

Saleable product: 200 tonne/day corrugating medium
110 tonne/day hardboard

Effluent Treatment: Primary:
Paper mill and Hardboard mill effluent: Clarifier

Effluent Discharge: 10,760 m3/day to Sturgeon River

Name: MALLETE KRAFT PULP AND POWER, SMOOTH ROCK FALLS

History: The mill was originally built in 1918 as a sulphite mill and was converted to a kraft mill in 1965.

Manufacturing Summary: Kraft pulping
Pulp bleaching

Mill Employees: 370

Production: 340 tonne/day bleached kraft pulp

Effluent Treatment: Primary:
Mill effluent: Clarifier
Final mill effluent: Settling pond followed by foam retention pond

Effluent Discharge: 53,000 m3/day to Mattagami River

Name: QUEBEC & ONTARIO PAPER COMPANY LTD., THOROLD

History: The mill began operation at the present site in 1913 and manufactured newsprint from sulphite and groundwood pulps. In the 1980's, the mill constructed a deinking plant for recycling newsprint and in 1987 the sulphite pulping operation was shut down. A high rate biological treatment system which utilizes oxygen, was installed to treat the wastes from the deinking operations. The mill is the only mill in Canada which recycles newsprint.

Manufacturing Summary: Newsprint deinking
Thermo-mechanical pulping (TMP)
Paper making

Mill Employees: 1150

Production: 460 tonne/day Thermo-mechanical pulp
540 tonne/day deinked fibre

Saleable product: 900 tonne/day newsprint

Effluent Treatment: Primary:

Mill effluent: Clarifier

Secondary:

Final effluent: UNOX biological treatment system followed by 2 Clarifiers

Effluent Discharge: 85,000 m³/day to Old Welland Canal

Name: SPRUCE FALLS POWER AND PAPER COMPANY, KAPUSKASING

History: The mill dates back to 1922 and produced newsprint from groundwood and calcium-based sulphite pulps until 1964. At that time, a new magnesium-based sulphite process (Magnefite) which included chemical recovery of spent pulping liquors was installed. In 1976, a new 200 tonne/day thermo-mechanical mill (TMP) was installed and the calcium sulphite operations were subsequently shut down in 1982. In 1983 the TMP mill was expanded to 300 tonne/day.

Manufacturing Summary: Magnefite pulping
Groundwood pulping
Thermo-mechanical pulping
Paper making

Mill Employees: 1200

Production: 130 tonne/day magnesite pulp
440 tonne/day groundwood pulp
320 tonne/day thermo-mechanical pulp

Saleable product: 923 tonne/day newsprint
70 tonne/day bulking paper

Effluent Treatment: Primary:
Woodroom effluent: Clarifier
Mill effluent: Clarifier

Effluent Discharge: 87,000 m³/day to Kapuskasing River

Name: ST. MARYS PAPER INC., SAULT STE. MARIE

History: The mill was constructed in 1900 and produced newsprint from sulphite and groundwood pulps. The sulphite pulping operations were shut down in the early 1970's with the sulphite pulp being replaced with purchased bleached kraft pulp. The mill currently produces groundwood specialty papers.

Manufacturing Summary: Groundwood pulping
Paper making

Mill Employees: 520

Production: 220 tonne/day Groundwood pulp

Saleable product 350 tonne/day Specialty groundwood

Effluent Treatment: Primary:
Final mill effluent: Clarifier

Effluent Discharge: 15,700 m³/day to St. Mary's River

Name: STRATHCONA PAPER COMPANY, STRATHCONA

History: Located north of Napanee, the mill was built in 1872 and used neighboring forests as a source of wood. The mill no longer pulps wood but now uses clean recycled waste paper and board as its source of fibre.

Manufacturing Summary: Waste paper and board repulping
Paperboard formation

Mill Employees: 160

Production: 165 tonne/day box board

Effluent Treatment: Primary:
Mill effluent: 5 settling ponds
Secondary:
Mill effluent: 2 aerated lagoons

Effluent Discharge: 3,200 m³/day to Napanee River

Name: PAPERBOARD INDUSTRIES CORPORATION, TRENT VALLEY PAPERBOARD MILLS DIVISION, TRENTON

History: The mill is made up of two separate mills, the east and west mills. The east mill, constructed in 1880, originally used straw and rags to make paperboard but today uses recycled wastepaper and board. In 1976 the west mill was built and incorporated modern-day recycling and screening technologies into its manufacturing operations.

Manufacturing Summary: Waste paper and board repulping
Paperboard formation

Mill Employees: 279

Production: 250 tonne/day paperboard

Effluent Treatment: Primary:
Mill effluent: Clarifier

Effluent Discharge: 2,400 m³/day to the Trent River

T A B L E S

TO THE DEVELOPMENT DOCUMENT FOR THE PULP AND PAPER SECTOR

TABLE 1.

HISTORICAL DATA REFERENCES

PULP AND PAPER INDUSTRY

The references listed below have been used by the Ministry of the Environment, MISA office, to assist in the definitions of environmental problems associated with the pulp and paper industry and to review current technologies that might be applied in the resolution of these problems:-

1. DEVELOPMENT DOCUMENT FOR EFFLUENT LIMITATIONS GUIDELINES, NEW SOURCE PERFORMANCE STANDARDS AND PRETREATMENT STANDARDS FOR THE PULP, PAPER, AND PAPERBOARD AND THE BUILDERS' PAPER AND BOARD MILLS POINT SOURCE CATEGORY OCTOBER 1982

Effluent Guidelines Division
Office of Water
U.S. Environmental Protection Agency
Washington, D.C. 20460

2. AQUATIC TOXICITY OF PULP AND PAPER MILL EFFLUENT: A REVIEW JUNE 1986

D. McLEAY AND ASSOCIATES LIMITED
(FOR ENVIRONMENT CANADA)

3. COOPERATIVE POLLUTION ABATEMENT RESEARCH (CPAR) PROGRAM OF THE FEDERAL GOVERNMENT AND THE CANADIAN PULP AND PAPER INDUSTRY 1970 - 1979

ENVIRONMENT CANADA

(Note: specific interest in proposals that dealt with treatment systems, toxicity of effluents, and effects on receiving waters)

4. WATER POLLUTION PROBLEMS OF PULP AND PAPER INDUSTRIES IN FINLAND AND SWEDEN

COMMITTEE FOR THE GULF OF BOTHNIA REPORT OF THE SPECIAL WORKING GROUP -
MAY 1987

(Naturvardsverket RAPPORT 3348)

TABLE 1. (cont)

HISTORICAL DATA REFERENCES

PULP AND PAPER INDUSTRY

5. SELECT INVENTORY OF CHEMICALS USED IN WISCONSIN'S LOWER FOX RIVER BASIN -
(FOX RIVER STUDY)

J.J. SULLIVAN & J.J. DELFINO
UNIVERSITY OF WISCONSIN
6. INVENTORY OF PULP AND PAPER MILL EFFLUENT CONSTITUENTS - LAKE SUPERIOR- , APRIL, 1986

C. CHERWINSKY AND D. MURRAY
ONTARIO MINISTRY OF THE ENVIRONMENT
7. NON-CONVENTIONAL POLLUTANTS IN PULP AND PAPER MILL EFFLUENTS

ONTARIO FOREST INDUSTRIES ASSOCIATION, 1987
8. ONTARIO PULP AND PAPER MILLS EFFLUENT COMPOSITION

ONTARIO FOREST INDUSTRIES ASSOCIATION, MAY 1988.

TABLE 2

Parameters of Concern Identified in Pulp and Paper Mill Effluents

	RATIONALE FOR INCLUSION
TOTAL METALS	
Aluminum	Moderately toxic, animal & suspect human carcinogen
Cadmium	Extremely toxic, moderately bioaccumulative
Copper	Toxic
Lead	Extremely toxic
Mercury	Extremely toxic, highly bioaccumulative
Zinc	Highly toxic
VOLATILES, HALOGENATED	
Bromodichloromethane	Mutagen
Carbon tetrachloride	Slightly toxic, animal & suspect human carcinogen
Chloroacetaldehyde	Mutagen
Chloroform	Slightly toxic, animal & suspect human carcinogen
Chlorofuranone	Mutagen
Chloropropenal	Mutagen
Dichloroacetone	Mutagen
Dichloroethane	Slightly toxic, animal carcinogen
Hexachloroacetone	Mutagen
Methylene Chloride	Mutagen
Pentachloroacetone	Mutagen
Pentachloropropene	Mutagen
Tetrachloroacetone	Mutagen
Tetrachloroethene	Mutagen
Tetrachloropropene	Mutagen
Trichloroacetone	Mutagen
Trichloroethane	Toxic, isomers 1,1,1-mutagen; 1,1,2-carcinogen
Trichloroethene	Mutagen
VOLATILES, NON-HALOGENATED	
Benzene	Moderately toxic, animal & suspect human carcinogen
Toluene	Moderately toxic, cancer promoter
Dimethyl Sulfide	USEPA parameter list
Dimethyl Disulfide	USEPA parameter list
EXTRACTABLES, BASE NEUTRALS	
Dibutyl phthalate	Human health risk
EXTRACTABLES, ACIDS (PHENOLS)	
2,4-dichlorophenol	USEPA parameter list
4,5-dichloroguaiacol	USEPA parameter list
2,4,5-trichlorophenol	USEPA parameter list
2,4,6-trichlorophenol	USEPA parameter list
3,4,5-trichloroguaiacol	USEPA parameter list
4,5,6-trichloroguaiacol	USEPA parameter list
2,3,4,6-tetrachlorophenol	High BCF
Pentachlorophenol	USEPA parameter list, high BCF
Phenol	Toxic, impair flavor of fish
2,3,4,5-Tetrachlorocatechol	High BCF
3,4,5,6-Tetrachloroguaiacol	USEPA parameter list, high BCF, high toxicity
DIOXINS AND BENZOFURANS	
RESIN AND FATTY ACIDS	
BCF Biocumulation Factor	

TABLE 3

Pre-Regulation Monitoring Open Characterization Data

COMPOUND	KRAFT	S / M	CORR	D / B / F / T
HYDROCARBONS				
1-Methylene-4-(1-methylethenyl) cyclohexane	*			
1-Methyl-4-(1-methylethyldene) cyclohexane	*			
1-Methyl-4-(1-methylethyl)-1,4-cyclohexatriene	*			
1,4-Dimethoxy-2-methyl Toluene	*			
4-Hydroxy-3-Methoxy Benzaldehyde	*			
Dimethoxy Benzene	*			
Dimethyl Styrene	*			
Etheno Tetralin		*		
Ethyl Styrene	*	*		
Hexahydromethanoindene	*			
Hexane		*	*	
Methyl Cyclopentane	*	*		*
Methyl Methylene bicyclo octene	*			
Methyl Naphthalene	*	*		
Phenyl Cydohexane		*		
Tetrahydro Methyl Naphthalene	*			
Tetrahydro Dimethyl Naphthalene	*			
t-Butyl Styrene	*			
Tetralin		*		
Trimethyl Indane		*		
Trimethyl Styrene	*			
Trimethyl Tetralin		*		
TERPINOIDS TYPE COMPOUNDS				
α-Terpineol	*	*		
4-(1-Methyl Ethyl)-1,5-Cyclohexadiene-1-methanol		*		
1,3,3-Trimethylbicyclo[2,2,1]Heptanol	*			
2,6,6-Trimethylbicyclo[3,1,1]heptan-3-one		*		
3,6,6-Trimethylbicyclo[3,1,1]heptan-2-one		*		
6,6-Dimethyl-2-Methylenebicyclo[3,1,1]Heptan-3-d	*	*		
6,6-Dimethylbicyclo[3,1,1]Hept-2-ene-2-Methanol	*			
Acetosyringone	*			
Borneol	*	*		
Camphor	*	*		
Carene	*			
Cineole	*	*		
D-Fenchone		*		
Fenchone	*	*		
Fenchyl Alcohol	*	*		
Homovanillic Acid	*	*		
Isoborneol	*			
Isoeugenol	*		*	*
Menthol	*			
Methyl Abietate		*		
Methyl-4-[1,5-Dimethyl-3-Oxohexyl]-1-Cyclohexene-1-Carboxylic		*		
α-Pinene	*			
β-Pinene	*			
Pinene	*			
Syringaldehyde	*		*	
Terpinen-4-ol	*			
Trimethyl Norbornanone	*	*		
Vanillin	*	*	*	*
Vanillic Acid			*	*
Verbenone	*			

TABLE 3 (cont)

Pre-Regulation Monitoring Open Characterization Data

COMPOUND	KRAFT	S / M	CORR	D / B / F / T
PHENOLS				
2-(2-Propenyl) Phenol			*	
2-Methoxy Phenol			*	
4-Hydroxy-3-Methoxy Benzaldehyde	*			
2,6-Dimethoxyphenol	*		*	
2,6-Dimethoxy-4-(2-Propenyl) Phenol			*	
2,6-bis-t-Butyl-4-Ethyl Phenol		*		
2,6-Dimethoxy-4-(2-Propenyl) Phenol	*			
Dimethoxy Phenol	*		*	*
Methoxy Phenol		*		
Methoxy Propyl Phenol	*			
Phenyl Phenol				*
CHLORINATED COMPOUNDS				
Chlorobenz Methanol	*			
Chlorotoluene				*
Dichloroguaiacol	*			
Tetrachlorodimethoxy Benzene	*			
Trichlorotrimethyl Benzene	*			
PHTHALATES				
Di-octyl Phthalate	*	*	*	*
Tetrachlorothiophene	*			
Trichlorodifluoroethane	*			
SULPHUR CONTAINING COMPOUNDS				
1-(3-thienyl) Ethanone	*			
3-(Methyl Thio)-1-Propene	*			
Carbon Disulphide				*
Dimethyl Sulphide	*			*
Dimethyl Disulphide	*			
Dimethyl Trisulphide	*			*
Dimethyl Tetrasulphide	*			
Methyl Thiophene		*		
Sulfonyl bis Methane	*			
Thiophene	*			
Thiophene Carboxylhyde	*			
KETONES				
1-(2,4-Dihydroxy-4-Methoxy Phenyl)-3-Phenyl-2-Propen-1-one			*	
1-(2,4-Dihydroxy Phenyl) Ethanone			*	
1-(4-Hydroxy-3-Methoxy Phenyl) Ethanone	*		*	
1-(4-Hydroxy-3,5-Dimethoxy Phenyl) Ethanone			*	*
2-Butanone	*			
2-Hydroxy cyclohexanone			*	
2-Hydroxy-3-Methyl-2-cyclopenten-1-one			*	
3-Methyl-2-Butanone	*			
4-(4-Hydroxy Phenyl)-2-Butanone			*	
4-Hydroxy-3,5-dimethoxyphenylacetophenone	*			
1,3,5-Tri-(2-Propenyl)-1,3,5-Triazine-2,4,6-(1H,2H,3H) Trione		*		
2,3,4-Trimethyl-2-Cyclopenten-1-one	*			
2,3,5-Trimethyl-2,5-cyclohexadiene-1,4-Dione			*	
3,4,5-Trimethyl-2-Cyclopenten-1-one	*			
Acetone	*	*	*	*
Acetophenone	*			*

TABLE 3 (cont)

Pre-Regulation Monitoring Open Characterization Data

COMPOUND	KRAFT	S / M	CORR	D / B / F P / T
KETONES (cont)				
Acetovanillone	*			*
Anthraquinone	*			
Benzophenone				*
Cyclohexyl Ethanone			*	
Cyclohexanone	*			
Hexane Dione			*	
Hydroxy Methyl Cyclopentenone			*	
Methyl Cyclopentenone	*			
Propanone		*		
Trimethyl Cyclopentenone			*	
ESTERS				
Butyl Ether				*
Ethyl Acetate				*
Isopropyl Acetate				*
Propyl Acetate				*
ALDEHYDES				
1,4-Dimethyl-Octahydro-1-Phenanthrene Carboxaldehyde		*		
[Hydroxy,Methoxy,Phenyl]Propanone		*		
Dimethyl Isopropyl Octahydrophenanthrene Carboxaldehyde		*		
Furan Carboxaldehyde		*		
Hexanal	*		*	
Isopropyl Dimethyl Octahydrophenanthrene Carboxaldehyde		*		
Methyl Furan Carboxaldehyde		*		
Trimethyl Ethenyl Doderahydro Phenanthrene Carboxaldehyde		*		
ALCOHOLS				
Δ,Δ,4-Trimethyl cyclohexene-1-Methanol	*			
1-(2-Butoxy Ethoxy) Ethanol	*			*
2-[2-Butoxyethoxy] Ethanol	*	*	*	*
2-[2-Butoxyethoxy] Ethanol Acetate	*	*	*	*
2-[2-(2-Butoxyethoxy) Ethoxy] Ethanol		*		*
2-[g-Octadecenyloxy] Ethanol		*		
2-Butoxy Ethanol				*
2-Ethyl-4-Methyl-1,3-Dioxolane				*
3β-5-Δ,2,4,5-Stigmast-7-en-3-ol		*		
3-Methoxy Heptene				*
5-(Pentyloxy)-1-Pentene		*		
5-(Pentyloxy)-2-Pentene		*		
1-(1-Methyl Propoxy) Butane				*
3,3-Dimethoxy[(1,1-Biphenyl)]-4,4-Diol		*		
3,7,11-Trimethyl-1,6,10-Dodecatien-3-ol		*		
4,7,10-Trimethyl-2,5,8,11-Tetraoxatetradecan-13-ol		*		
Benzene Methanol	*		*	*
[Butoxy Ethoxy] Ethanol	*	*		
[Butoxy Ethoxy] Ethanol/Acetate		*		
Butoxy Ethanol	*			*
Dimethyl Isopropyl Octahydro Phenanthrene Methanol		*		
Ergost-5-en-3-ol		*		
Ethanol	*			
Ethenyl Decahydrotetramethyl Methylene Naphthalene Propanol	*			
Furan Methanol	*		*	
Isopropyl Methyl Cyclohexanal	*			
Methoxy Ethoxy Ethanol		*		
Octahydro Dimethyl Isopropyl Phenanthrene Methanol		*		
Tetramethyl Methylene Ethenyl Decahydro Naphthalene Propanol		*		

TABLE 3 (cont)

Pre-Regulation Monitoring Open Characterization Data

COMPOUND	KRAFT	S / M	CORR	D / B / FP / T
CARBOXYLIC ACIDS				
1,4-Dimethyl-Octahydro-1-Phenanthrene Carboxylic Acid		*		
9,12-Octadecadienoic Acid			*	
Benzoic Acid			*	
Trimethyl-7-Ethyl-Tetradecahydro-1-Phenanthrene Carboxylic Acid		*		
MISCELLANEOUS COMPOUNDS				
1-[4-Hydroxy-3-Methoxy Phenyl] Propanone		*		
2-Ethylhexyl diphenyl phosphate		*		
2-Methoxy-4-propylphenol		*		
2-Methyl-5-propylthiophene	*			
2-[2-(2-Ethoxyethoxy)ethoxy]ethanol				*
3-(4-Methoxy Phenol)-2-Propanoic Acid	*			
3-Methylfuran			*	
3-Methyl-6-(1-methylethylidene)cyclohexene	*			
4-Butoxybutanoic acid	*			
4-Ethenyl-1,4-dimethylcyclohexene	*			
4-Methylene-(1-methylethynyl)cyclohexene	*			
5-Methyl-3-(1-methylethynyl)cyclohexene	*			
5-Pentyloxy-2-Pentene		*		
1,1-[Oxybis[2,1-Ethane Diyloxy]] bis Butane				*
2,3-Dihydro-1,4-Benzodioxin			*	
2,5-Dimethylfuran			*	
3,4-Dimethyl-2,4,6-Octatriene	*			
1,1,1-Trichloroethane	*	*		*
1,3,5-Tri-2-Propenyl-1,3,5-Triazine-2,4,6-Trione		*		*
2,3,4-Trimethylcyclopentenone	*			
2,5,8,11,14-Pentaoxapentadecane		*		
Benzene Acetonitrile				*
Butoxy Butanic Acid	*			
Butyl Methoxy Benzene	*			
Cymene	*	*	*	*
Dibutyl Ether		*		
Diethylbiphenyl	*			
Dihydroxy Phenyl Ethanone	*			
Dimethyl Isopropyl Octahydro Naphthalene		*		
Ergosterol	*			
Ethyl Benzaldehyde	*			
Guaiacol	*			
Mentha-4,8-diene-2,5,5-trimethyl-1,3,6-hexatriene	*			
Methyl Cyclopentanone	*			*
Methyl Isothiocyanate		*		
Methyl Methylene Isopropyl Octahydro Naphthalene		*		
N-cyclohexyl Formamide		*		
N,N-Diethyl-3-Methyl Benzamide		*		
Octahydro-8a-methyl-2(1h)-Naphthalenone		*		
Pentamethyl-3-Ethenyl Dodecahydro Naphtho[2.1.b.] Pyran	*	*		
Phosphoric Acid Diethyl Pentyl Ester		*		
Stigmastanol		*		
Thienylethanone	*			
Tri-(2-chloroethanol) Phosphate		*		
Trimethyl Cyclopentenone		*		*

NOMENCLATURE FOR TABLE 4

All concentrations in µg/l, (ppb)

Symbol Used	Explanation of Symbol Used in MDATA column
<n<W	Result is below the Analytical Method Detection Limit, n
<n<	Result is below the Analytical Method Detection Limit, n
N.D.	Result is below the Analytical Method Detection Limit
x<SQ	Less than based on a semi-quantitative method
x<T	Result is above the Analytical Method Detection Limit, but the value is tentative only.
x	Analytical result
IAR	No numeric result
IAW	No data: analysis withdrawn
IBL	No Data, Unreliable Blank Sample
INP	No Data: No appropriate procedure available
ISS	No Data: Separate sample, Proper preservation required
NSS	No suitable sample
SPL	Several peaks, Large, not priority pollutants
SQT	Result based on semi-quantitative method
x UIN	Unreliable: indeterminate interference
X1	Diluted by 10 detection limits 10 times normal
X2	Diluted by 100 detection limits 100 times normal

Min, Max and Mean values taken from Appendix 1 of "Ontario Pulp and Paper Mills Effluent Composition"; Ontario Forest Industries Association, May, 1988

Mdata values taken from MOE sampling results, 1987

Pre-Regulation Monitoring EMPPL Data

Sulphate (Kraft) Category

	Boise-Cascade, Fort Frances				Canadian-Pacific, Dryden				Canadian-Pacific, Thunder Bay				Domtar Inc., Cornwall				Domtar Inc, Red Rock			
	MIN	MAX	MEAN	MDATA	MIN	MAX	MEAN	MDATA	MIN	MAX	MEAN	MDATA	MIN	MAX	MEAN	MDATA	MIN	MAX	MEAN	MDATA
TOTAL METALS																				
Aluminum	820	3400	1693	IBL	1900	2400	2112.5	<10<	2900	5800	4200	5800	1550	2900	2238		2700	5900	4075	3700
Beryllium				<50<				<10<				<50<								<10<
Cadmium	N.D.	1.8	0.4	<10<	0.2	1.25	0.7	<1<	0.7	2.6	1.5	<15<	0.8	1.3	1.1		0.2	0.65	0.5	<2<
Chromium	N.D.	40	1.38	<10<	40	80	58.8	<10<	110	680	370	430	N.D.	20	11.3		N.D.	10	6.3	10
Colbalt				<10<				<10<				<50<								<10<
Copper	5	25	17.5	<10<	N.D.	20	7.5	20	N.D.	30	15.6	<50<	10	20	13.8		5	15	10	10
Lead	N.D.	4	1.8	<10<	N.D.	7	2.1	<10<	N.D.	7.5	2.9	<15<	3	9	5		N.D.	4	2	<20<
Molybdenum				<50<				<10<				<50<								<10<
Nickel	N.D.	N.D.	5	<10<	N.D.	N.D.	5	<10<	N.D.	20	8.8	<50<	N.D.	10	7.5		N.D.	N.D.	5	<10<
Silver				<25<				<30<				<25<								<30<
Thallium	20	40	35	1000<sq	60	90	67.5	<500<	N.D.	40	22.5	500<sq	20	20	20		N.D.	N.D.	10	500<sq
Vanadium				<10<				<10<				<100<								<10<
Zinc	50	160	120	<10<	40	100	70	20	50	160	98.8	140	40	50	42.5		30	50	40	30
Cyanide	N.D.	N.D.	1	<1<W	N.D.	N.D.	1		N.D.	N.D.	1	<1<W	N.D.	4	1.8		N.D.	N.D.	1	<1<W
Mercury	N.D.	0.25	0.081	0.02	0.15	0.3	0.263	ISS	N.D.	0.2	0.12	0.07	N.D.	N.D.	0.025		N.D.	0.1	0.004	0.03
HYDRIDES																				
Antimony				1				1				1								250<sq
Arsenic	N.D.	1	0.6	<1<	N.D.	N.D.	0.5	<1<	N.D.	2	0.9	1	N.D.	2	0.9		N.D.	2	1.1	<1<
Selenium				5				<1<				<1<								<1<
VOLATILES, HALOGENATED																				
1,1,2,2-Tetrachloroethane				<2<W				<5<W				<10<W								<2<W
1,1,2-Trichloroethane	N.D.	N.D.	0.3	<2<W	N.D.	0.7	0.4	<5<W	N.D.	N.D.	0.3	<10<W	N.D.	N.D.	0.3		N.D.	N.D.	0.3	<2<W
1,1-Dichloroethane	N.D.	N.D.	0.1	<2<W	N.D.	N.D.	0.1	<5<W	N.D.	N.D.	0.1	<10<W	N.D.	N.D.	0.1		N.D.	N.D.	0.1	<2<W
1,1-Dichloroethylene				SPL				<5<W				<10<W								<2<W
1,2-Dichlorobenzene	N.D.	N.D.	0.2	<2<W	N.D.	2.5	0.7	<5<W	N.D.	N.D.	0.2	<10<W	N.D.	N.D.	0.2		N.D.	N.D.	0.2	<2<W
1,2-Dichloroethane (Ethylene dichloride)	N.D.	N.D.	0.1	<2<W	N.D.	3.3	0.9	<5<W	N.D.	N.D.	0.1	<10<W	N.D.	N.D.	0.1		N.D.	N.D.	0.1	<2<W
1,2-Dichloropropane	N.D.	N.D.	0.1	INP	N.D.	N.D.	0.1	INP	N.D.	N.D.	0.1	INP	N.D.	N.D.	0.1		N.D.	N.D.	0.1	INP
1,3-Dichlorobenzene	N.D.	N.D.	0.2	<2<W	N.D.	N.D.	0.2	<5<W	N.D.	N.D.	0.2	<10<W	N.D.	N.D.	0.2		N.D.	N.D.	0.2	<2<W
1,4-Dichlorobenzene	N.D.	N.D.	0.2	<2<W	N.D.	N.D.	0.2	<5<W	N.D.	2.5	0.7	<10<W	N.D.	N.D.	0.2		N.D.	N.D.	0.2	<2<W
Bromoform				<2<W				<5<W				<10<W								<2<W
Bromomethane																				
Carbon tetrachloride	N.D.	N.D.	0.5	<2<W	N.D.	N.D.	0.5	<5<W	N.D.	N.D.	0.5	<10<W	N.D.	N.D.	0.5		N.D.	N.D.	0.5	<2<W
Chlorobenzene	N.D.	N.D.	0.1	<2<W	N.D.	N.D.	0.1	<5<W	N.D.	N.D.	0.1	<10<W	N.D.	N.D.	0.1		N.D.	N.D.	0.1	<2<W
Chloroform	119	339	225.3	232X1	128	416	246.3	439X2	769	1110	955.8	2177X2	110	158	128.5		29.1	153	72.3	11<T
Chloromethane																				
Cis-1,3-Dichloropropylene																				
Dibromochloromethane	N.D.	N.D.	0.1	<2<W	N.D.	N.D.	0.1	<5<W	N.D.	N.D.	0.1	<10<W	0.3	0.5	0.3		N.D.	N.D.	0.1	<2<W
Bromodichloromethane	N.D.	N.D.	0.1	<2<W	N.D.	N.D.	0.1	<5<W	1.2	3.6	2.1	<10<W	N.D.	1.1	0.9		N.D.	N.D.	0.1	<2<W
Ethylene dibromide																				
Methylene chloride	N.D.	37.5	19.2	<2<W	N.D.	25.9	10.2	25<T	N.D.	54	17.3	12<T	N.D.	49.5	26.4		13	41.5	27	17<T
Tetrachloroethylene (Perchloroethylene)				<2<W				<5<W				<10<W								<2<W
Trans-1,2-Dichloroethylene				<2<W				<5<W				<10<W								<2<W
Trans-1,3-Dichloropropylene																				
Trichloroethylene				<2<W				<5<W				<10<W								<2<W
Trichloroethene	N.D.	N.D.	0.1		N.D.	0.4	0.2		N.D.	0.4	0.2		N.D.	N.D.	0.1					
Trichlorofluoromethane	N.D.	2.6	0.8		N.D.	N.D.	0.3	2.3	N.D.	N.D.	0.3		N.D.	N.D.	0.3					
Vinyl chloride (Chloroethylene)																				

TABLE 4 (cont)

Pre-Regulation Monitoring EMPPL Data

Sulphate (Kraft) Category

	Boise-Cascade, Fort Frances				Canadian-Pacific, Dryden				Canadian-Pacific, Thunder Bay				Domtar Inc., Cornwall				Domtar Inc, Red Rock			
	MIN	MAX	MEAN	MDATA	MIN	MAX	MEAN	MDATA	MIN	MAX	MEAN	MDATA	MIN	MAX	MEAN	MDATA	MIN	MAX	MEAN	MDATA
VOLATILES, NON-HALOGENATED																				
Benzene	N.D.	N.D.	1	<2<W	N.D.	N.D.	1	<5<W	N.D.	N.D.	1	<10<W	N.D.	8.5	5.6		N.D.	N.D.	1	<2<W
Toluene	N.D.	3.4	1.3	<2<W	N.D.	N.D.	1.5	<5<W	N.D.	N.D.	1.5	<10<W	N.D.	N.D.	1.5		N.D.	N.D.	1.5	<2<W
o-Xylene				<2<W				<5<W				<10<W								<2<W
m-Xylene and p-Xylene				<2<W				<5<W				<10<W								<2<W
EXTRACTABLES, BASE NEUTRAL																				
Acenaphthene												<1<W								<1<W
5-nitro Acenaphthene																				
Acenaphthylene	N.D.	N.D.	0.5		N.D.	N.D.	0.5		N.D.	N.D.	0.5	<1<W	N.D.	4	2.3		N.D.	N.D.	0.5	2<T
Anthracene	N.D.	N.D.	0.5		N.D.	N.D.	0.5		N.D.	N.D.	0.5	<1<W	N.D.	1.6	0.9		N.D.	N.D.	0.5	<1<W
Benz(a)anthracene												<2<W								<2<W
Benzo(a)pyrene												<2<W								<2<W
Benzo(b)fluoranthene																				
Benzo(ghi)perylene												<2<W								<2<W
Benzo(k)fluoranthene												<5<W								<5<W
Camphene												INP								
1-Chloronaphthalene												INP								
2-Chloronaphthalene												<1<W								
Chrysene												<1<W								<1<W
Dibenz(a,h)anthracene												<4<W								<4<W
Fluoranthene	N.D.	N.D.	0.5		N.D.	3.9	1.4		N.D.	N.D.	0.5	<1<W	1.3	2	1.3		N.D.	N.D.	0.5	<1<W
Fluorene												<1<W								<1<W
Indeno(1,2,3-cd)pyrene												<1<W								<1<W
Indole												INP								
1-Methylnaphthalene												<1<W								IAW
2-Methylnaphthalene												<1<W								
Naphthalene	N.D.	N.D.	0.5		N.D.	N.D.	0.5		N.D.	N.D.	0.5	<1<W	3.3	10.6	6.5		N.D.	N.D.	0.5	<1<W
Perylene												INP								
Phenanthrene	N.D.	N.D.	0.5		N.D.	N.D.	0.5		N.D.	N.D.	0.5	<1<W	5.4	8.2	7		N.D.	N.D.	0.5	<1<W
Pyrene	N.D.	N.D.	0.5		N.D.	N.D.	0.5		N.D.	N.D.	0.5	<1<W	N.D.	1.2	0.7		N.D.	N.D.	0.5	<1<W
Benzyl butyl phthalate	N.D.	49.1	16.1		N.D.	77.7	31.6		N.D.	11.6	3.8	<1<W	N.D.	N.D.	0.5		N.D.	N.D.	0.5	2<T
Bis(2-ethylhexyl) phthalate	7.2	110	32.5		4	148	41.3		N.D.	16.5	6	<5<W	2	5.7	3.4		2.6	314	81.1	<5<W
Di-n-butyl phthalate	4.8	231	67.9		22	248	165.8		7.7	160	49.2	<1<W	8.6	90	30.1		4.2	53	20.3	<1<W
Di-n-octyl phthalate												<2<W								<2<W
4-Bromophenyl phenyl ether												<1<W								<1<W
4-Chlorophenyl phenyl ether												<1<W								<1<W
Bis(2-chloroisopropyl)ether												<1<W								
Bis(2-chloroethyl)ether												3								IAW
Diphenyl ether												INP								
2,4-Dinitrotoluene												<1<W								<2<W
2,6-Dinitrotoluene												<1<W								<1<W
Bis(2-chloroethoxy)methane												<1<W								<1<W
Diphenylamine																				
N-Nitrosodiphenylamine												<1<W								<1<W
N-Nitrosodi-n-propylamine												<2<W								

Pre-Regulation Monitoring EMPPL Data

	Boise-Cascade, Fort Frances				Canadian-Pacific, Dryden				Canadian-Pacific, Thunder Bay				Domtar Inc., Cornwall				Domtar Inc, Red Rock			
	MIN	MAX	MEAN	MDATA	MIN	MAX	MEAN	MDATA	MIN	MAX	MEAN	MDATA	MIN	MAX	MEAN	MDATA	MIN	MAX	MEAN	MDATA
EXTRACTABLES, ACID (PHENOLS)																				
2,3,4,5-Tetrachlorophenol												<1<W								<1<W
2,3,4,6-Tetrachlorophenol												<1<W								<1<W
2,3,5,6-Tetrachlorophenol												<1<W								
2,3,4-Trichlorophenol												<1<W								
2,3,5-Trichlorophenol																				
2,4,5-Trichlorophenol												<1<W								
2,4,6-Trichlorophenol	N.D.	17	6.1		N.D.	39.2	25.4		N.D.	10.5	7.7	8	N.D.	N.D.	2.5		N.D.	N.D.	2.5	3<T
2,4-Dimethyl phenol												<6<W								IAW
2,4-Dinitrophenol												INP								INP
2,4-Dichlorophenol	N.D.	4	2.9		N.D.	11.8	5.6		N.D.	4	2.8	<1<W	N.D.	N.D.	2.5		N.D.	N.D.	2.5	<1<W
2,6-Dichlorophenol												<1<W								
4,6-Dinitro-o-cresol																				INP
2-Chlorophenol												<1<W								
4-Chloro-3-methylphenol																				
4-Nitrophenol												<2<W								<2<W
m-Cresol												<1<W								
o-Cresol												<1<W								
p-Cresol												INP								
Pentachlorophenol												<1<W								<1<W
Phenol	N.D.	2	1.3		N.D.	68.8	18		1.7	7.4	4.8	7	70.1	380	169.2		N.D.	50	25.3	27
Extractables, Neutrals																				
1,2,3,4-Tetrachlorobenzene				<.001<W				<.001<W					<.001<W							<.001<W
1,2,4,5-Tetrachlorobenzene				<.001<W				0.358					<.001<W							<.001<W
1,2,3,5-Tetrachlorobenzene				<.001<W				<.001<W					<.001<W							<.001<W
1,2,3-Trichlorobenzene				<.001<W				<.001<W					<.001<W							<.001<W
1,2,4-Trichlorobenzene				<.002<W				<.002<W					<.002<W							<.002<W
2,4,5-Trichlorotoluene				0.045				0.1					<.001<W							<.001<W
Hexachlorobenzene				0.005				<.001<W					<.001<W							<.001<W
Hexachlorobutadiene				<.001<W				<.001<W					<.001<W							<.001<W
Hexachlorocyclopentadiene																				
Hexachloroethane				&																

Pre-Regulation Monitoring EMPPL Data

Pre-Regulation Monitoring EMPPL Data

	E.B. Eddy, Espanola				James River, Marathon				Kimberly Clark, Terrace Bay				Malette, Smooth Rock Falls			
	MIN	MAX	MEAN	MDATA	MIN	MAX	MEAN	MDATA	MIN	MAX	MEAN	MDATA	MIN	MAX	MEAN	MDATA
TOTAL METALS																
Aluminum	800	880	842.5	620	310	600	482.5	<1000<	400	1130	707.5	<1000<	2800	5500	4250	4100
Beryllium				<10<				<50<				<50<				<50<
Cadmium	0.8	1.3	1.1	<1<	0.4	1.6	0.9	<10<	0.9	1.2	1.1	<10<	0.6	1.8	1.4	<15<
Chromium	N.D.	10	7.5	10	N.D.	N.D.	5	<100<	N.D.	60	30	<100<	N.D.	40	15	50
Cobalt				10				<100<				<100<				<50<
Copper	N.D.	20	8.1	<10<	N.D.	15	7.5	<100<	N.D.	20	11.3	<100<	N.D.	20	10.6	<50<
Lead	1	4	2	20	1	4	2.8	<100<	N.D.	5.5	2.6	<100<	N.D.	5	2.5	<150<
Molybdenum				<10<				<50<				<50<				<50<
Nickel	N.D.	40	20	<20<	N.D.	N.D.	5	<100<	N.D.	N.D.	0.5	<100<	N.D.	N.D.	5	<50<
Silver				<30>				<250<				<250<				<250>
Thallium	N.D.	20	15	500<sq	N.D.	N.D.	5	<5000<	N.D.	30	15	<5000<	N.D.	20	12.5	500<sq
Vanadium				<100<				<100<				<100<				<50<
Zinc	60	80	75	40	60	220	110	<100<	65	190	126.3	110	80	180	132.5	200
Cyanide	N.D.	N.D.	0.1	<1<W	N.D.	N.D.	1	<5<W	N.D.	4	1.8	8	N.D.	N.D.	1	5<T
Mercury	N.D.	N.D.	0.025	<01<	N.D.	0.05	0.031	ISS	N.D.	0.1	0.04	ISS	N.D.	0.2	0.069	50
HYDRIDES																
Antimony				4				<1<				<1<				2
Arsenic	N.D.	N.D.	0.5	1	N.D.	2.5	1	<1<	N.D.	2	0.9	<1<	N.D.	2	0.9	2
Selenium				1				<1<				<1<				1
VOLATILES, HALOGENATED																
1,1,2,2-Tetrachloroethane				<10<W				<2<W				<2<W				<10<W
1,1,2-Trichloroethane	N.D.	N.D.	0.3	<10<W	N.D.	N.D.	0.3	<2<W	N.D.	N.D.	0.3	<2<W	N.D.	N.D.	0.3	<10<W
1,1-Dichloroethane	N.D.	N.D.	0.1	<10<W	N.D.	N.D.	0.1	<2<W	N.D.	N.D.	0.1	<2<W	N.D.	N.D.	0.1	<10<W
1,1-Dichloroethylene				<10<W				SPL				SPL				<10<W
1,2-Dichlorobenzene	N.D.	N.D.	0.2	<10<W	N.D.	N.D.	0.2	<2<W	N.D.	N.D.	0.2	<2<W	N.D.	N.D.	0.2	<10<W
1,2-Dichloroethane (Ethylene dichloride)	N.D.	N.D.	0.1	<10<W	N.D.	N.D.	0.1	<2<W	N.D.	N.D.	0.1	<2<W	N.D.	N.D.	0.1	<10<W
1,2-Dichloropropane	N.D.	N.D.	0.1	INP	N.D.	N.D.	0.1	INP	N.D.	N.D.	0.1	INP	N.D.	0.6	0.3	INP
1,3-Dichlorobenzene	N.D.	N.D.	0.2	<10<W	N.D.	N.D.	0.2	<2<W	N.D.	N.D.	0.2	<2<W	N.D.	N.D.	0.2	<10<W
1,4-Dichlorobenzene	N.D.	N.D.	0.2	<10<W	N.D.	N.D.	0.2	<2<W	N.D.	N.D.	0.2	<2<W	N.D.	0.7	0.3	<10<W
Bromoform				<10<W				<2<W				<2<W				<10<W
Bromomethane																
Carbon tetrachloride	N.D.	N.D.	0.5	<10<W	N.D.	N.D.	0.5	<2<W	N.D.	N.D.	0.5	<2<W	1	2.4	1.7	<10<W
Chlorobenzene	N.D.	N.D.	0.1	<10<W	N.D.	N.D.	0.1	<2<W	N.D.	N.D.	0.1	<2<W	N.D.	N.D.	0.1	<10<W
Chloroform	30	50	38.6	22<T	596	1400	1086	659X2	436	688	539.8	931X2	458	797	586.3	1630.X2
Chloromethane																
Cis-1,3-Dichloropropylene																
Dibromochloromethane	N.D.	N.D.	0.1	<10<W	N.D.	N.D.	0.1	<2<W	N.D.	N.D.	0.1	<2<W	N.D.	N.D.	0.1	<10<W
Bromodichloromethane	0.3	0.9	0.4	<10<W	N.D.	3.4	1.6	<2<W	N.D.	0.8	0.4	<2<W	N.D.	1	0.5	<10<W
Ethylene dibromide																
Methylene chloride	N.D.	51.5	27.4	21<T	N.D.	30.1	14.1	4<T	N.D.	44.7	14.9	4<T	N.D.	37.4	13.1	20<T
Tetrachloroethylene (Perchloroethylene)				<10<W				<2<W				<2<W				<10<W
Trans-1,2-Dichloroethylene				<10<W				<2<W								
Trans-1,3-Dichloropropylene																
Trichloroethylene				<10<W				<2<W				<2<W				<10<W
Trichloroethene	N.D.	N.D.	0.1		N.D.	0.8	0.5		N.D.	N.D.	0.1		N.D.	0.8	0.4	
Trichlorofluoromethane	N.D.	N.D.	0.3		N.D.	N.D.	0.3		N.D.	N.D.	0.3		N.D.	0.5	0.3	
Vinyl chloride (Chloroethylene)																

Pre-Regulation Monitoring EMPPL Data

Sulphate (Kraft) Category

	E.B. Eddy, Española				James River, Marathon				Kimberly Clark, Terrace Bay				Malette, Smooth Rock Falls			
	MIN	MAX	MEAN	MDATA	MIN	MAX	MEAN	MDATA	MIN	MAX	MEAN	MDATA	MIN	MAX	MEAN	MDATA
VOLATILES, NON-HALOGENATED																
Benzene	N.D.	N.D.	1	<10<W	N.D.	N.D.	1	<2<W	N.D.	4.3	1.8	<2<T	N.D.	N.D.	1	<10<W
Toluene	N.D.	N.D.	1.5	<10<W	N.D.	N.D.	1.5	<2<W	N.D.	9.1	5.8	<2<W	N.D.	3.9	2.1	<10<W
o-Xylene				<10<W				<2<W				<2<W				<10<W
m-Xylene and p-Xylene				<10<W				<2<W				<2<W				<10<W
EXTRACTABLES, BASE NEUTRAL																
Acenaphthene				<1<W												<1<W
5-nitro Acenaphthene																
Acenaphthylene	N.D.	N.D.	0.5	<1<W	N.D.	N.D.	0.5		N.D.	N.D.	0.5		N.D.	N.D.	0.5	<1<W
Anthracene	N.D.	N.D.	0.5	<1<W	N.D.	N.D.	0.5		N.D.	N.D.	0.5		N.D.	N.D.	0.5	<1<W
Benzo(a)anthracene				<2<W												<2<W
Benzo(a)pyrene				<2<W												<2<W
Benzo(b)fluoranthene				<5<W												
Benzo(ghi)perylene				<2<W												<2<W
Benzo(k)fluoranthene				<5<W												
Camphene				INP												
1-Chloronaphthalene																
2-Chloronaphthalene				<1<W												
Chrysene				<1<W												
Dibenz(a,h)anthracene				<4<W												
Fluoranthene	N.D.	N.D.	0.5	<1<W	N.D.	N.D.	0.5		N.D.	3.7	1.6		N.D.	N.D.	0.5	<1<W
Fluorene				<1<W												<1<W
Indeno(1,2,3-cd)pyrene				<1<W												<1<W
Indole																
1-Methylnaphthalene				<1<W												
2-Methylnaphthalene				<1<W												
Naphthalene	N.D.	N.D.	0.5	<1<W	N.D.	N.D.	0.5		N.D.	7.2	2.8		N.D.	N.D.	0.5	<1<W
Perylene																
Phenanthrene	N.D.	N.D.	0.5	<1<W	N.D.	N.D.	0.5		N.D.	9.1	3.5		N.D.	N.D.	0.5	<1<W
Pyrene	N.D.	N.D.	0.5	<1<W	N.D.	N.D.	0.5		N.D.	2.4	1		N.D.	N.D.	0.5	<1<W
Benzyl butyl phthalate	N.D.	1.4	0.6	<1<W	N.D.	1.7	0.8		N.D.	60	15.4		N.D.	46.6	12.4	<1<W
Bis(2-ethylhexyl) phthalate	N.D.	6.8	4.6	<5<W	3.3	873	222.2		N.D.	68	20.4		N.D.	6.4	3.2	<5<W
Di-n-butyl phthalate	10.6	132	43.4	<1<W	6.6	120	72.4		4.9	260	71.9		10	246	76.3	<1<W
Di-n-octyl phthalate				<2<W												<2<W
4-Bromophenyl phenyl ether				<1<W												<1<W
4-Chlorophenyl phenyl ether				<1<W												<1<W
Bis(2-chloroisopropyl)ether				<1<W												<1<W
Bis(2-chloroethyl)ether				<3<W												
Diphenyl ether				INP												
2,4-Dinitrotoluene				<1<W												<1<W
2,6-Dinitrotoluene				<1<W												<1<W
Bis(2-chloroethoxy)methane				<1<W												
Diphenylamine																
N-Nitrosodiphenylamine				<1<W												<1<W
N-Nitrosodi-n-propylamine				<2<W												

TABLE 4 (cont)

Pre-Regulation Monitoring EMPPL Data

Sulphate (Kraft) Category

	E.B. Eddy, Espanola				James River, Marathon				Kimberly Clark, Terrace Bay				Malette, Smooth Rock Falls			
	MIN	MAX	MEAN	MDATA	MIN	MAX	MEAN	MDATA	MIN	MAX	MEAN	MDATA	MIN	MAX	MEAN	MDATA
EXTRACTABLES, ACID (PHENOLS)																
2,3,4,5-Tetrachlorophenol				<1<W												<1<W
2,3,4,6-Tetrachlorophenol				<1<W												<1<W
2,3,5,6-Tetrachlorophenol				<1<W												<1<W
2,3,4-Trichlorophenol				<1<W												<1<W
2,3,5-Trichlorophenol																
2,4,5-Trichlorophenol				<1<W												<1<W
2,4,6-Trichlorophenol	N.D.	N.D.	2.5	<4<T	N.D.	15.5	11.3		N.D.	12.1	7.5		N.D.	8.1	3.9	4<T
2,4-Dimethyl phenol				<5<W												<5<W
2,4-Dinitrophenol				INP												INP
2,4-Dichlorophenol	N.D.	N.D.	2.5	<1<W	N.D.	6.1	4.1		N.D.	N.D.	2.5		N.D.	5.9	3.4	3
2,6-Dichlorophenol				<1<W												
4,6-Dinitro-o-cresol				INP												INP
2-Chlorophenol				<1<W												<1<W
4-Chloro-3-methylphenol																
4-Nitrophenol				<2<W												<2<W
m-Cresol				<1<W												
o-Cresol				<1<W												
p-Cresol				INP												
Pentachlorophenol				<1<W												<1<W
Phenol	N.D.	N.D.	1	<1<W	20	3710	947		28.7	58.8	44.1		13.5	79.5	36.3	69
Extractables, Neutrals																
1,2,3,4-Tetrachlorobenzene				<.001<W				<.001<W				<.001<W				<.001<W
1,2,4,5-Tetrachlorobenzene				<.001<W				<.001<W				<.001<W				<.001<W
1,2,3,5-Tetrachlorobenzene				<.001<W				<.001<W				<.001<W				<.001<W
1,2,3-Trichlorobenzene				<.001<W				<.001<W				<.001<W				<.001<W
1,2,4-Trichlorobenzene				<.002<W				<.002<W				<.002<W				<.002<W
2,4,5-Trichlorotoluene				<.001<W				<.001<W				<.001<W				<.001<W
Hexachlorobenzene				<.001<W				<.001<W				<.001<W				<.001<W
Hexachlorobutadiene				<.001<W				<.001<W				<.001<W				<.001<W
Hexachlorocyclopentadiene																
Hexachloroethane				<.001<W				<.001<W				<.001<W				<.001<W
Octachlorostyrene				NSS				NSS				<.001<W				NSS
Pentachlorobenzene				<.001<W				<.001<W				<.001<W				<.001<W

Pre-Regulation Monitoring EMPPL Data

Pre-Regulation Monitoring EMPPL Data

	Abitibi-Price, Fort Williams				Abitibi-Price, Iroquois Falls				Abitibi-Price, Provincial				Abitibi-Price, Thunder Bay			
	MIN	MAX	MEAN	MDATA	MIN	MAX	MEAN	MDATA	MIN	MAX	MEAN	MDATA	MIN	MAX	MEAN	MDATA
TOTAL METALS																
Aluminum	480	10600	3970	3300	4500	5000	4675	IBL	480	1020	680	510	1000	1540	1250	920
Beryllium				<10<				<50<				<10<				<10<
Cadmium	0.4	0.8	0.7	<2<	0.5	0.95	0.7	<10<	N.D.	0.7	0.4	<2<	0.2	0.9	0.7	<2<
Chromium	N.D.	20	10	30	N.D.	20	11.3	<100<	N.D.	10	6.3	<10<	N.D.	N.D.	5	10
Cobalt				10				<100<				<10<				<10<
Copper	10	20	14.4	20	20	23	20.8	<100<	N.D.	10	5	<10<	10	40	17.5	10
Lead	1	12	4.5	<20<	N.D.	9	4.4	<100<	N.D.	1	0.8	<20<	N.D.	3	2.1	<20<
Molybdenum				<10<				<50<				<10<				<10<
Nickel	N.D.	N.D.	5	10	N.D.	N.D.	5	<100<	N.D.	N.D.	5	<10<	N.D.	N.D.	5	10
Silver				<30<				<250<				<30<				<30<
Thallium	N.D.	N.D.	10	500<SQ	N.D.	N.D.	10	<500<	N.D.	N.D.	10	500<SQ	N.D.	N.D.	10	500<SQ
Vanadium				10				<100<				<10<				<10<
Zinc	30	75	60	50	100	140	122.5	210	40	80	60	30	60	100	80	60
Cyanide	N.D.	N.D.	1	<1<W	N.D.	N.D.	1	<1<W	N.D.	N.D.	1	<1<W	N.D.	N.D.	1	<1<W
Mercury	N.D.	0.1	0.04	<.01<	N.D.	N.D.	0.025	0.02	N.D.	N.D.	0.025	0.01	N.D.	N.D.	0.025	0.02
HYDRIDES																
Antimony				<1<				6				<1<				2
Arsenic	N.D.	N.D.	0.5	<1<	N.D.	2	1.3	2	N.D.	N.D.	0.5	<1<	N.D.	N.D.	0.5	<1<
Selenium				<1<				<1<W				<1<				<1<
VOLATILES, HALOGENATED																
1,1,2,2-Tetrachloroethane				<1<W				<5<W				<1<W				<5<W
1,1,2-Trichloroethane	N.D.	N.D.	0.3	<1<W	N.D.	N.D.	0.3	<5<W	N.D.	N.D.	0.3	<1<W	N.D.	N.D.	0.3	<5<W
1,1-Dichloroethane	N.D.	N.D.	0.1	<1<W	N.D.	N.D.	0.1	<5<W	N.D.	N.D.	0.1	<1<W	N.D.	N.D.	0.1	<5<W
1,1-Dichloroethylene				<1<W				<5<W				<1<W				<5<W
1,2-Dichlorobenzene	N.D.	N.D.	0.2	<1<W	N.D.	N.D.	0.2	<5<W	N.D.	N.D.	0.2	<1<W	N.D.	N.D.	0.2	<5<W
1,2-Dichloroethane (Ethylene dichloride)	N.D.	N.D.	0.1	<1<W	N.D.	N.D.	0.1	<5<W	N.D.	N.D.	0.1	<1<W	N.D.	N.D.	0.1	<5<W
1,2-Dichloropropane	N.D.	N.D.	0.1	INP	N.D.	N.D.	0.1	INP	N.D.	N.D.	0.1	INP	N.D.	N.D.	0.1	INP
1,3-Dichlorobenzene	N.D.	N.D.	0.2	<1<W	N.D.	N.D.	0.2	<5<W	N.D.	2.4	0.8	<1<W	N.D.	2.4	0.8	<5<W
1,4-Dichlorobenzene	N.D.	N.D.	0.2	<1<W	N.D.	N.D.	0.2	<5<W	N.D.	N.D.	0.2	<1<W	N.D.	N.D.	0.2	<5<W
Bromoform				<1<W				<5<W				<1<W				<5<W
Bromomethane																
Carbon tetrachloride	N.D.	N.D.	0.5	<1<W	N.D.	N.D.	0.5	<5<W	N.D.	N.D.	0.5	<1<W	N.D.	N.D.	0.5	<5<W
Chlorobenzene	N.D.	N.D.	0.1	<1<W	N.D.	N.D.	0.1	<5<W	N.D.	N.D.	0.1	<1<W	N.D.	N.D.	0.1	<5<W
Chloroform	28	83	52.8	92X1	15	23	19.5	28<T	1.7	5.7	3.5	6<T	3.3	7.2	5	7<T
Chloromethane																
Cis-1,3-Dichloropropylene																
Dibromochloromethane	N.D.	N.D.	0.1	<1<W	N.D.	N.D.	0.1		N.D.	N.D.	0.1	<1<W	N.D.	N.D.	0.1	<5<W
Bromodichloromethane	N.D.	0.4	0.2	<1<W	N.D.	0.3	0.2	<5<W	N.D.	0.4	0.2	<1<W	N.D.	0.4	0.2	<5<W
Ethylene dibromide																
Methylene chloride	N.D.	28	15	5<T	N.D.	21.9	9.2	22<T	N.D.	39.7	18	5<T	N.D.	N.D.	5	21<T
Tetrachloroethylene (Perchloroethylene)								<5<W				<1<W				<5<W
Trans-1,2-Dichloroethylene				<1<W				<5<W				<1<W				<5<W
Trans-1,3-Dichloropropylene																
Trichloroethylene				<1<W				<5<W				<1<W				<5<W
Trichloroethene	N.D.	N.D.	0.1		N.D.	N.D.	0.1		N.D.	N.D.	0.1		N.D.	N.D.	0.1	
Trichlorofluoromethane	N.D.	2.4	0.8		N.D.	N.D.	0.3		N.D.	N.D.	0.3		N.D.	N.D.	0.3	
Vinyl chloride (Chloroethylene)																



[REDACTED]

TABLE 4 (cont)

Pre-Regulation Monitoring EMPPL Data
Sulphite/Mechanical Category

	Abitibi-Price, Fort Williams				Abitibi-Price, Iroquois Falls				Abitibi-Price, Provincial				Abitibi-Price, Thunder Bay			
	MIN	MAX	MEAN	MDATA	MIN	MAX	MEAN	MDATA	MIN	MAX	MEAN	MDATA	MIN	MAX	MEAN	MDATA
EXTRACTABLES, ACID (PHENOLS)																
2,3,4,5-Tetrachlorophenol				<1<W								<1<W				<1<W
2,3,4,6-Tetrachlorophenol				<1<W								<1<W				<1<W
2,3,5,6-Tetrachlorophenol																
2,3,4-Trichlorophenol																
2,3,5-Trichlorophenol																
2,4,5-Trichlorophenol																
2,4,6-Trichlorophenol	N.D.	N.D.	2.5	<1<W	N.D.	N.D.	2.5		N.D.	N.D.	2.5	<1<W	N.D.	N.D.	2.5	<1<W
2,4-Dimethyl phenol				IAW								IAW				IAW
2,4-Dinitrophenol				INP								INP				INP
2,4-Dichlorophenol	N.D.	N.D.	2.5	<1<W	N.D.	N.D.	2.5		N.D.	N.D.	2.5	<1<W	N.D.	N.D.	2.5	<1<W
2,6-Dichlorophenol																
4,6-Dinitro-o-cresol				INP								INP				INP
2-Chlorophenol																
4-Chloro-3-methylphenol																
4-Nitrophenol				<2<W								<2<W				<2<W
m-Cresol																
o-Cresol																
p-Cresol																
Pentachlorophenol				<1<W								<1<W				<1<W
Phenol	15.7	47.8	31.7	940 IAR	N.D.	3.6	2.3		N.D.	N.D.	1	2<T	N.D.	12	4.2	8
Extractables, Neutrals																
1,2,3,4-Tetrachlorobenzene				<.001<W				<.001<W				<.001<W				<.001<W
1,2,4,5-Tetrachlorobenzene				<.001<W				<.001<W				<.001<W				<.001<W
1,2,3,5-Tetrachlorobenzene				0.04				<.001<W				<.001<W				<.001<W
1,2,3-Trichlorobenzene				<.001<W				<.001<W				<.001<W				<.001<W
1,2,4-Trichlorobenzene				<.002<W				<.002<W				<.002<W				<.002<W
2,4,5-Trichlorotoluene				0.145				<.001<W				<.001<W				<.001<W
Hexchlorobenzene				<.001<W				<.001<W				<.001<W				<.001<W
Hexachlorobutadiene				<.001<W				<.001<W				<.001<W				<.001<W
Hexachlorocyclopentadiene																
Hexachloroethane				<.001<W				<.001<W				<.001<W				<.001<W
Octachlorostyrene				NSS				NSS				NSS				NSS
Pentachlorobenzene				<.001<W				<.001<W				<.001<W				<.001<W

Pre-Regulation Monitoring EMPPL Data

Sulphite/Mechanical Category

[illegible]

Pre-Regulation Monitoring EMPPL Data

Sulphite/Mechanical Category

	Boise Cascade, kenora				Quebec & Ontario Paper				Spruce Falls Paper				St. Marys Paper			
	MIN	MAX	MEAN	MDATA	MIN	MAX	MEAN	MDATA	MIN	MAX	MEAN	MDATA	MIN	MAX	MEAN	MDATA
VOLATILES, NON-HALOGENATED																
Benzene	N.D.	N.D.	1	<1<W	N.D.	2.7	1.4		N.D.	N.D.	1	<1<W	N.D.	N.D.	1	<1<W
Toluene	N.D.	11.2	3.9	<1<W	316	1720	696.3		N.D.	3.1	1.9	<1<W	8.1	12.7	9	8<T
o-Xylene				<1<W								<1<W				<1<W
m-Xylene and p-Xylene				<1<W								1<T				<1<W
EXTRACTABLES, BASE NEUTRAL																
Acenaphthene																<1<W
5-nitro Acenaphthene																INP
Acenaphthylene	N.D.	N.D.	0.5		N.D.	N.D.	0.5		N.D.	N.D.	0.5		N.D.	N.D.	0.5	<1<W
Anthracene	N.D.	N.D.	0.5		N.D.	N.D.	0.5		N.D.	N.D.	0.5		N.D.	N.D.	0.5	<1<W
Benz(a)anthracene																<2<W
Benzo(a)pyrene																<2<W
Benzo(b)fluoranthene																<5<W
Benzo(ghi)perylene																<2<W
Benzo(k)fluoranthene																<5<W
Camphene																INP
1-Chloronaphthalene																INP
2-Chloronaphthalene																<1<W
Chrysene																<1<W
Dibenz(a,h)anthracene																<4<W
Fluoranthene	N.D.	N.D.	0.5		N.D.	N.D.	0.5		N.D.	N.D.	0.5		N.D.	N.D.	0.5	<1<W
Fluorene																<1<W
Indeno(1,2,3-cd)pyrene																<1<W
Indole																INP
1-Methylnaphthalene																<1<W
2-Methylnaphthalene																<1<W
Naphthalene	N.D.	N.D.	0.5		N.D.	N.D.	0.5		N.D.	N.D.	0.5		N.D.	2	1	<1<W
Perylene																INP
Phenanthrene	N.D.	N.D.	0.5		N.D.	N.D.	0.5		N.D.	N.D.	0.5		N.D.	N.D.	0.5	<1<W
Pyrene	N.D.	N.D.	0.5		N.D.	N.D.	0.5		N.D.	N.D.	0.5		N.D.	N.D.	0.5	<1<W
Benzyl butyl phthalate	N.D.	N.D.	0.5		N.D.	7.9	2.4		N.D.	N.D.	0.5		N.D.	N.D.	0.5	<1<W
Bis(2-ethylhexyl) phthalate	2.4	37.6	19.8		N.D.	8	5		1.7	11.9	5.2		N.D.	10	5.2	<5<W
Di-n-butyl phthalate	4.8	150	70.1		10	141	44.2		4.9	134	46.2		12.6	393	109.2	<1<W
Di-n-octyl phthalate																<2<W
4-Bromophenyl phenyl ether																<1<W
4-Chlorophenyl phenyl ether																<1<W
Bis(2-chloroisopropyl)ether																<1<W
Bis(2-chloroethyl)ether																7
Diphenyl ether																INP
2,4-Dinitrotoluene																<1<W
2,6-Dinitrotoluene																<1<W
Bis(2-chloroethoxy)methane																<1<W
Diphenylamine																
N-Nitrosodiphenylamine																<1<W
N-Nitrosodi-n-propylamine																<2<W

TABLE 4 (cont)

Pre-Regulation Monitoring EMPPL Data

Sulphite/Mechanical Category

	Boise Cascade, kenora				Quebec & Ontario Paper				Spruce Falls Paper				St. Marys Paper			
	MIN	MAX	MEAN	MDATA	MIN	MAX	MEAN	MDATA	MIN	MAX	MEAN	MDATA	MIN	MAX	MEAN	MDATA
EXTRACTABLES, ACID (PHENOLS)																
2,3,4,5-Tetrachlorophenol																1<T
2,3,4,6-Tetrachlorophenol																<1<W
2,3,5,6-Tetrachlorophenol																<1<W
2,3,4-Trichlorophenol																<1<W
2,3,5-Trichlorophenol																
2,4,5-Trichlorophenol																<1<W
2,4,6-Trichlorophenol	N.D.	N.D.	2.5		N.D.	N.D.	2.5		N.D.	N.D.	2.5		N.D.	N.D.	2.5	<1<W
2,4-Dimethyl phenol																<5<W
2,4-Dinitrophenol																INP
2,4-Dichlorophenol	N.D.	N.D.	2.5		N.D.	N.D.	2.5		N.D.	N.D.	2.5		N.D.	N.D.	2.5	<1<W
2,6-Dichlorophenol																<1<W
4,6-Dinitro-o-cresol																INP
2-Chlorophenol																<1<W
4-Chloro-3-methylphenol																
4-Nitrophenol																<2<W
m-Cresol																<1<W
o-Cresol																<1<W
p-Cresol																INP
Pentachlorophenol																<1<W
Phenol	N.D.	2.2	1.4		N.D.	164	51.8		N.D.	6.1	3.1		N.D.	30	14.9	<1<W
Extractables, Neutrals																
1,2,3,4-Tetrachlorobenzene				NSS								<.001<W				<.001<W
1,2,4,5-Tetrachlorobenzene				NSS								<.001<W				<.001<W
1,2,3,5-Tetrachlorobenzene				NSS								<.001<W				<.001<W
1,2,3-Trichlorobenzene				NSS								<.001<W				<.001<W
1,2,4-Trichlorobenzene				NSS								0.013				<.002<W
2,4,5-Trichlorotoluene				NSS								0.025				<.001<W
Hexchlorobenzene				NSS								<.001<W				<.001<W
Hexachlorobutadiene				NSS								0.012				<.001<W
Hexachlorocyclopentadiene																
Hexachloroethane				NSS								<.001<W				<.001<W
Octachlorostyrene				NSS								NSS				NSS
Pentachlorobenzene				NSS								<.001<W				<.001<W

TABLE 4 (cont)

Pre-Regulation Monitoring EMPPL Data

Corrugating Category

	Domtar Inc., Trenton				MacMillan-Blodel			
	MIN	MAX	MEAN	MDATA	MIN	MAX	MEAN	MDATA
TOTAL METALS								
Aluminum	1340	7900	3710		2100	2900	2500	
Beryllium								
Cadmium	0.7	3.4	2		4.2	7.3	5.8	
Chromium	N.D.	20	8.8		N.D.	N.D.	5	
Cobalt								
Copper	15	80	43.8		20	40	30	
Lead	6	36.5	18.4		N.D.	7	3.8	
Molybdenum								
Nickel	N.D.	N.D.	5		N.D.	N.D.	5	
Silver								
Thallium	N.D.	20	17.5		N.D.	30	20	
Vanadium								
Zinc	50	200	132.5		840	840	835	
Cyanide	N.D.	10	4.3		N.D.	N.D.	1	4<T
Mercury	0.2	0.68	0.45		N.D.	N.D.	0.025	<.01<
HYDRIDES								
Antimony								
Arsenic	N.D.	2	0.9		N.D.	N.D.	0.5	
Selenium								
VOLATILES, HALOGENATED								
1,1,2,2-Tetrachloroethane								
1,1,2-Trichloroethane	N.D.	N.D.	0.3		N.D.	N.D.	0.3	
1,1-Dichloroethane	N.D.	N.D.	0.1		N.D.	N.D.	0.1	<5<W
1,1-Dichloroethylene								<5<W
1,2-Dichlorobenzene	N.D.	N.D.	0.2		N.D.	N.D.	0.2	<5<W
1,2-Dichloroethane (Ethylene dichloride)	N.D.	N.D.	0.1		N.D.	N.D.	0.1	<5<W
1,2-Dichloropropane	N.D.	N.D.	0.1		N.D.	N.D.	0.1	INP
1,3-Dichlorobenzene	N.D.	N.D.	0.2		N.D.	0.6	0.4	<5<W
1,4-Dichlorobenzene	N.D.	N.D.	0.2		N.D.	N.D.	0.2	<5<W
Bromoform								<5<W
Bromomethane								
Carbon tetrachloride	N.D.	N.D.	0.5		N.D.	N.D.	0.5	<5<W
Chlorobenzene	N.D.	N.D.	0.1		N.D.	N.D.	0.1	<5<W
Chloroform	1	6	3.8		N.D.	0.7	0.4	<5<W
Chloromethane								
Cis-1,3-Dichloropropylene								
Dibromochloromethane	N.D.	N.D.	0.1		N.D.	N.D.	0.1	<5<W
Bromodichloromethane	N.D.	0.2	0.2		N.D.	N.D.	0.1	<5<W
Ethylene dibromide								
Methylene chloride	N.D.	125	38		27	45	36	28<T
Tetrachloroethylene (Perchloroethylene)								
Trans-1,2-Dichloroethylene								<5<W
Trans-1,3-Dichloropropylene								
Trichloroethylene								<5<W
Trichloroethane	N.D.	N.D.	0.1		N.D.	N.D.	0.1	
Trichlorofluoromethane	N.D.	1.6	0.6		N.D.	N.D.	0.25	
Vinyl chloride (Chloroethylene)								

[REDACTED]

TABLE 4 (cont)

Pre-Regulation Monitoring EMPPL Data

Corrugating Category

[illegible]

Pre-Regulation Monitoring EMPPL Data

Deinking/Board/Fine Paper/Tissue Category

[illegible]

TABLE 4 (cont)

Pre-Regulation Monitoring EMPPL Data

Deinking/Board/Fine Paper/Tissue Category

	Fraser Inc.				Beaver Wood Fibre Co. Ltd.				Strathcona Paper Co.				Trent Valley Paperboard			
	MIN	MAX	MEAN	MDATA	MIN	MAX	MEAN	MDATA	MIN	MAX	MEAN	MDATA	MIN	MAX	MEAN	MDATA
VOLATILES, NON-HALOGENATED																
Benzene	N.D.	N.D.	1		N.D.	N.D.	1		N.D.	N.D.	1		N.D.	N.D.	1	
Toluene	3.4	14.2	7.4		N.D.	10	4.1		N.D.	N.D.	1.5		N.D.	6.7	4.4	
p-Xylene																
m-Xylene and p-Xylene																
EXTRACTABLES, BASE NEUTRAL																
Acenaphthene																
5-nitro Acenaphthene																
Acenaphthylene	N.D.	N.D.	0.5		N.D.	N.D.	0.5		N.D.	N.D.	0.5		N.D.	N.D.	0.5	
Anthracene	N.D.	N.D.	0.5		N.D.	N.D.	0.5		N.D.	N.D.	0.5		N.D.	N.D.	0.5	
Benz(a)anthracene																
Benzo(a)pyrene																
Benzo(b)fluoranthene																
Benzo(ghi)perylene																
Benzo(k)fluoranthene																
Camphene																
1-Chloronaphthalene																
2-Chloronaphthalene																
Chrysene																
Dibenz(a,h)anthracene																
Fluoranthene	N.D.	N.D.	0.5		N.D.	N.D.	0.5		N.D.	N.D.	0.5		N.D.	N.D.	0.5	
Fluorene																
Indeno(1,2,3-cd)pyrene																
Indole																
1-Methylnaphthalene																
2-Methylnaphthalene																
Naphthalene	N.D.	43.3	25.6		N.D.	N.D.	0.5		N.D.	N.D.	0.5		N.D.	N.D.	0.5	
Perylene																
Phenanthrene	N.D.	N.D.	0.5		N.D.	N.D.	0.5		N.D.	N.D.	0.5		N.D.	N.D.	0.5	
Pyrene	N.D.	N.D.	0.5		N.D.	N.D.	0.5		N.D.	N.D.	0.5		N.D.	N.D.	0.5	
Benzyl butyl phthalate	N.D.	5.5	2.5		N.D.	18	5.3		N.D.	N.D.	0.5		2	5.7	3.3	
Bis(2-ethylhexyl) phthalate	5.4	13.7	8.9		4.2	45.4	20.9		2.4	13	5.8		2.3	12.4	6.1	
Di-n-butyl phthalate	12.9	130	47.5		8	176	64.7		3.3	7.9	5.3		26.6	168	83.1	
Di-n-octyl phthalate																
4-Bromophenyl phenyl ether																
4-Chlorophenyl phenyl ether																
Bis(2-chloroisopropyl)ether																
Bis(2-chloroethyl)ether																
Diphenyl ether																
2,4-Dinitrotoluene																
2,6-Dinitrotoluene																
Bis(2-chloroethoxy)methane																
Diphenylamine																
N-Nitrosodiphenylamine																
N-Nitrosodi-n-propylamine																



[REDACTED]

Pre-Regulation Monitoring EMPPL Data
Deinking/Board/Fine Paper/Tissue Category[illegible]

Pre-Regulation Monitoring EMPPL Data
Deinking/Board/Fine Paper/Tissue Category

	Domtar Inc., St. Catharines				E.B. Eddy, Ottawa				Kimberly Clark, Huntville				Kimberly Clark, St. Catharines			
	MIN	MAX	MEAN	MDATA	MIN	MAX	MEAN	MDATA	MIN	MAX	MEAN	MDATA	MIN	MAX	MEAN	MDATA
VOLATILES, NON-HALOGENATED																
Benzene	N.D.	N.D.	1		N.D.	N.D.	1		N.D.	N.D.	1		N.D.	N.D.	1	
Toluene	N.D.	3.3	2		N.D.	7.6	3		N.D.	N.D.	1.5		N.D.	16	7.6	
o-Xylene																
m-Xylene and p-Xylene																
EXTRACTABLES, BASE NEUTRAL																
Acenaphthene																
5-nitro Acenaphthene																
Acenaphthylene	N.D.	N.D.	0.5		N.D.	N.D.	0.5		N.D.	N.D.	0.5		N.D.	N.D.	0.5	
Anthracene	N.D.	N.D.	0.5		N.D.	N.D.	0.5		N.D.	N.D.	0.5		N.D.	N.D.	0.5	
Benz(a)anthracene																
Benzo(a)pyrene																
Benzo(b)fluoranthene																
Benzo(ghi)perylene																
Benzo(k)fluoranthene																
Camphene																
1-Chloronaphthalene																
2-Chloronaphthalene																
Chrysene																
Dibenz(a,h)anthracene																
Fluoranthene	N.D.	N.D.	0.5		N.D.	N.D.	0.5		N.D.	N.D.	0.5		N.D.	N.D.	0.5	
Fluorene																
Indeno(1,2,3-cd)pyrene																
Indole																
1-Methylnaphthalene																
2-Methylnaphthalene																
Naphthalene	N.D.	N.D.	0.5		N.D.	1.4	0.9		N.D.	N.D.	0.5		5.8	10.1	7.8	
Perylene																
Phenanthrene	N.D.	N.D.	0.5		N.D.	N.D.	0.5		N.D.	N.D.	0.5		N.D.	N.D.	0.5	
Pyrene	N.D.	N.D.	0.5		N.D.	N.D.	0.5		N.D.	N.D.	0.5		N.D.	N.D.	0.5	
Benzyl butyl phthalate	N.D.	1.2	0.7		N.D.	13	3.6		N.D.	N.D.	0.5		N.D.	1.9	0.9	
Bis(2-ethylhexyl) phthalate	N.D.	7	3.7		2.4	12.7	42.4		N.D.	15.8	6.1		N.D.	11	4.6	
Di-n-butyl phthalate	5.2	14	8.6		7.3	190	58.4		3.7	50.6	25.5		7.9	30.4	17.8	
Di-n-octyl phthalate																
4-Bromophenyl phenyl ether																
4-Chlorophenyl phenyl ether																
Bis(2-chloroisopropyl)ether																
Bis(2-chloroethyl)ether																
Diphenyl ether																
2,4-Dinitrotoluene																
2,6-Dinitrotoluene																
Bis(2-chloroethoxy)methane																
Diphenylamine																
N-Nitrosodiphenylamine																
N-Nitrosodi-n-propylamine																

TABLE 4 (cont)

Pre-Regulation Monitoring EMPPL Data

Deinking/Board/Fine Paper/Tissue Category

[illegible]

TABLE 5

List of Target Parameters Analyzed (Industry)

Volatile Organics

Benzene	Dichloromethane
Bromodichloromethane	1,2-Dichloropropane
Bromoform	cis-1,3-Dichloropropene
Bromomethane	trans-1,3-Dichloropropene
Carbon tetrachloride	Ethylbenzene
Chlorobenzene	Methylstyrene isomers
Chloroethane	Mesitylene
2-Chloroethyl vinyl ether	Styrene
Chloroform	1,1,2,2-Tetrachloroethane
Chloromethane	Tetrachloroethylene
Dibromochloromethane	Toluene
1,2-Dichlorobenzene	1,1,1-Trichloroethane
1,3-Dichlorobenzene	1,1,2-Trichloroethane
1,4-Dichlorobenzene	Trichloroethylene
1,1-Dichloroethylene	Trichlorofluoromethane
1,1-Dichloroethane	m+p-Xylene
1,2-Dichloroethane	o-Xylene
trans-1,2-Dichloroethylene	Vinyl chloride

Base/Neutral Extractables

Acenaphthene	3,3'-Dichlorobenzidine
Acenaphthylene	Diethyl phthalate
Anthracene	Dimethyl phthalate
Benzidine	2,4-Dinitrotoluene
Benz(a)anthracene	2,6-Dinitrotoluene
Benzo(b)fluoranthene	1,2-Diphenylhydrazine
Benzo(k)fluoranthene	Di-n-octyl phthalate
Benzo(a)pyrene	Fluoranthene
Benzo(ghi)perylene	Fluorene
Benzyl butyl phthalate	Hexachlorobenzene
Bis(2-chloroethyl)ether	Hexachlorobutadiene
Bis(2-chloroethoxy)methane	Hexachlorocyclopentadiene
Bis(2-ethylhexyl)phthalate	Hexachloroethane
Bis(2-chloroisopropyl)ether	Indeno(1,2,3-cd)pyrene
4-Bromophenyl phenyl ether	Isophorone
2-Chloronaphthalene	Naphthalene
4-Chlorophenyl phenyl ether	Nitrobenzene
Chrysene	N-Nitroso-di-n-propylamine
Dibenz(a,h)anthracene	N-Nitrosodiphenylamine
Di-n-butyl phthalate	Phenanthrene
1,3-Dichlorobenzene	Pyrene
1,4-Dichlorobenzene	1,2,4-Trichlorobenzene
1,2-Dichlorobenzene	

TABLE 5 (cont)

List of Target Parameters Analyzed (Industry)

Acid Extractables

Phenol	2-Nitrophenol
2-Chlorophenol	2,4-Dinitrophenol
2,4-Dimethylphenol	2-Methyl-4,6-dinitrophenol
4-Chloro-3-methylphenol	4-Nitrophenol
2,4-Dichlorophenol	Pentachlorophenol
2,4,6-Trichlorophenol	

Organo-Chlorine Pesticides and PCBs

Aroclor 1242	Endosulfan I
Aroclor 1254	trans-Chlordane
Aroclor 1260	Dieldrin
α -BHC	p,p'-DDE
β -BHC	Endrin
γ -BHC	p,p'-DDD
Lindane	Endosulfan II
Heptachlor	Endosulfan sulfate
Aldrin	Endrin aldehyde
Heptachlor epoxide	p,p'-DDT
cis-Chlordane	Toxaphene

Inorganics

Aluminum	Chloride
Antimony	Nitrite
Arsenic	Nitrate
Beryllium	Sulphate
Cadmium	Total phosphate-P
Chromium	Total Kjeldahl nitrogen
Copper	Ammonia nitrogen
Lead	
Magnesium	Calcium
Mercury	Potassium
Nickel	Sodium
Selenium	
Silver	Cyanide
Thallium	
Zinc	

Others

Rainbow trout 96-h LC₅₀
 Biochemical oxygen demand (BOD₅)
 Suspended solids
 pH

TABLE 6

Tracking Parameters After Initial Data Screening (Industry)

PARAMETER RETAINED	PARAMETER ELIMINATED
<u>Volatiles:</u>	
Benzene (*)	Bromoform
Bromodichloromethane (*)	Bromomethane
Carbon tetrachloride (*)	Chloroethane
Chlorobenzene (*)	2-Chloromethyl vinyl ether
Chloroform (*)	Chloromethane
Dibromochloromethane (*)	trans-1,2-Dichloroethylene
1,2-Dichlorobenzene (*)	cis-1,3-Dichloropropene
1,3-Dichlorobenzene (*)	trans-1,3-Dichloropropene
1,4-Dichlorobenzene (*)	Methylstyrene isomers
1,1-Dichloroethylene (*)	Mesitylene
1,1-Dichloroethane (*)	Styrene
1,2-Dichloroethane (*)	1,1,2,2-Tetrachloroethane
Dichloromethane	m- + p-Xylene
1,2-Dichloropropane (*)	o-Xylene
Ethylbenzene (*)	Vinyl Chloride
Tetrachloroethylene (*)	
Toluene (*)	
1,1,1-Trichloroethane (*)	
1,1,2-Trichloroethane	
Trichloroethylene (*)	
Trichlorofluoromethane	
<u>Base/Neutral Extractables:</u>	
Acenaphthylene (*)	Acenaphthene
Anthracene	Benzidine
Benzyl butyl phthalate	Benz(a)anthracene
Bis(2-ethylhexyl) phthalate	Benzo(b)fluoranthene
Di-n-butyl phthalate	Benzo(k)fluoranthene
1,3-Dichlorobenzene	Benzo(a)pyrene
Diethyl phthalate	Benzo(ghi)perylene
Dimethyl phthalate	Bis(2-chloroethyl) ether
Fluoranthene (*)	Bis(2-chloroethoxy) methane
Isophorone	Bis(2-chloroisopropyl)
ether	
Naphthalene (*)	4-Bromophenyl phenyl ether
Phenanthrene (*)	2-Chloronaphthalene
Pyrene	4-Chlorophenyl phenyl ether
	Chrysene
	Dibenz(a,h)anthracene
	1,4-Dichlorobenzene
	1,2-Dichlorobenzene
	3,3'-Dichlorobenzidine
	2,4-Dinitrotoluene
	2,6-Dinitrotoluene
	1,2-Diphenylhydrazine

TABLE 6 (cont)

Tracking Parameters After Initial Data Screening (Industry)

PARAMETER RETAINED	PARAMETER ELIMINATED
	Di-n-octyl phthalate Fluorene Hexachlorobenzene Hexachlorobutadiene Hexachlorocyclopentadiene Hexachloroethane Indeno(1,2,3-cd)pyrene Nitrobenzene N-Nitroso-di-n-propylamine N-Nitrosodiphenylamine 1,2,4-Trichlorobenzene
	<u>Acid Extractables:</u>
Phenol (*)	2-Chlorophenol
2,4-Dichlorophenol (*)	2,4-Dimethylphenol
2,4,6-Trichlorophenol(*)	4-Chloro-3-methylphenol
	2-Nitrophenol
	2,4-Dinitrophenol
	2-Methyl-4,6-dinitrophenol
	4-Nitrophenol
	Pentachlorophenol
	<u>Organochlorine Pesticides and PCBs:</u>
	Aroclor 1242
	Aroclor 1254
	Aroclor 1260
	α -BHC
	β -BHC
	γ -BHC
	Lindane
	Heptachlor
	Aldrin
	Heptachlor epoxide
	cis-Chlordane
	Endosulfan I
	trans-Chlorodane
	Dieldrin
	p,p'-DDE
	Endrin
	p,p'-DDD
	Endosulfan II
	Endosulfan sulfate
	Endrin aldehyde
	p,p'-DDT
	Toxaphene

TABLE 6 (cont)

Tracking Parameters After Initial Data Screening (Industry)

PARAMETER RETAINED	PARAMETER ELIMINATED
<u>Inorganics:</u>	
Aluminum (*)	Antimony
Arsenic	Beryllium
Cadmium (*)	Selenium
Chromium (*)	Silver
Copper (*)	
Lead (*)	
Magnesium (*)	
Mercury (*)	
Nickel (*)	
Thallium (*)	
Zinc (*)	
Chloride (*)	
Nitrite (*)	
Nitrate (*)	
Sulphate (*)	
Total phosphate-P (*)	
Total Kjeldahl nitrogen (*)	
Total ammonia nitrogen (*)	
Calcium (*)	
Potassium (*)	
Sodium (*)	
Cyanide (*)	
<u>Others:</u>	
BOD ₅	
TSS	
pH	
Rainbow trout LC ₅₀	
(*) Indicate parameters which were considered relevant to the industry as listed on Table 3.2.	

KRAFT MILLS	DISCHARGE POINT	TOT DAILY VOLUME	MISA CLASS	COST PER DISCHARGE	TOTAL COST **
*Boise-Cascade Canada Ltd., Fort Frances	Final Effluent	93,000	G+K	\$162,581.00	\$164,363.00
	Point Source Storm Water Effluent		T,W	\$930.00	
	Point Source Storm Water Effluent		W	\$852.00	
*Canadian Pacific Forest Products Ltd, Dryden	Final Effluent	84,000	G+K	\$162,581.00	\$166,807.00
	Point Source Storm Water Effluent		T,F	\$1,372.00	
	Point Source Storm Water Effluent		C	\$852.00	
	Point Source Storm Water Effluent		B	\$852.00	
	Point Source Storm Water Effluent		D,W,C	\$1,150.00	
Canadian Pacific Forest Products Ltd, Thunder Bay	Final Effluent	152,000	G+K	\$158,041.00	\$172,181.00
	Clean Water Outfall	70,000	CWE	\$8,940.00	
	Point Source Storm Water Effluent		T	\$122.00	
	Point Source Storm Water Effluent		F	\$1,372.00	
	Point Source Storm Water Effluent		C,B	\$852.00	
	Point Source Storm Water Effluent		D,W	\$1,150.00	
	Point Source Storm Water Effluent		W	\$852.00	
	Point Source Storm Water Effluent		W,C	\$852.00	
Domtar Inc., Fine Papers Division, Cornwall	Final Effluent	102,400	G+K	\$158,041.00	\$162,193.00
	Point Source Storm Water Effluent		D	\$1,100.00	
	Point Source Storm Water Effluent		D	\$1,100.00	
	Point Source Storm Water Effluent		W	\$852.00	
	Point Source Storm Water Effluent		D	\$1,100.00	
Domtar Inc., Containerboard Division, Red Rock	Final Effluent	91,000	G+K	\$158,041.00	\$158,973.00
	Point Source Storm Water Effluent		C,T	\$932.00	
*E.B. Eddy Forest Products Ltd., Espanola	Final Effluent	102,000	G+K	\$135,897.00	\$296,820.00
	Clarifier Overflow	15,600	G+K	\$158,041.00	
	Point Source Storm Water Effluent		T,C	\$930.00	
	Point Source Storm Water Effluent		W,C,B	\$852.00	
	Point Source Storm Water Effluent		D	\$1,100.00	

Cost of Analysis

TABLE 7

TABLE 7 (cont)

Cost of Analysis

	DISCHARGE POINT	TOT DAILY VOLUME	MISA CLASS	COST PER DISCHARGE	TOTAL COST ***
KRAFT MILLS					
James River Marathon, Marathon	Final Effluent	64,530	G+K	\$158,041.00	\$179,749.00
	Cooling Water		CWE	\$8,940.00	
	Cooling Water		CWE	\$8,940.00	
	Point Source Storm Water Effluent		T	\$122.00	
	Point Source Storm Water Effluent		C	\$852.00	
	Point Source Storm Water Effluent		W	\$852.00	
	Point Source Storm Water Effluent		B	\$852.00	
	Point Source Storm Water Effluent		B,D	\$1,150.00	
Kimberly-Clark of Canada Limited, Terrace Bay	Alkaline Sewer + Acid Sewer Combined Sample	121,120	G+K	\$158,041.00	\$159,867.00
	Point Source Storm Water Effluent		W	\$852.00	
	Point Source Storm Water Effluent		C	\$852.00	
	Point Source Storm Water Effluent		T	\$122.00	
Malette Kraft Pulp & Power Div., Smooth Rock Falls	Final Effluent	53,000	G+K	\$158,041.00	\$167,721.00
	Waste Disposal Site Effluent		WDSE	\$7,776.00	
	Point Source Storm Water Effluent		T,W,C	\$930.00	
	Point Source Storm Water Effluent		T	\$122.00	
	Point Source Storm Water Effluent		W	\$852.00	
MECHANICAL/SULPHITE					
Abitibi-Price, Fort William Division	Final Effluent	10,200	G+S/M	\$104,509.00	\$194,586.00
	Bark Lagoon Effluent	4,460	G+S/M	\$88,373.00	
	Point Source Storm Water Effluent		W,C,B	\$852.00	
	Point Source Storm Water Effluent		W,B	\$852.00	
Abitibi-Price, Iroquois Falls Division	Final Effluent	53,300	G+S/M	\$95,913.00	\$109,367.00
	Filter Plant Backwash		BWE	\$1,632.00	
	Cooling Water		CWE	\$8,940.00	
	Point Source Storm Water Effluent		D	\$1,100.00	
	Point Source Storm Water Effluent		W	\$852.00	
	Point Source Storm Water Effluent		T,C,B	\$930.00	

MECHANICAL/SULPHITE	DISCHARGE POINT	TOT DAILY VOLUME	MISA CLASS	COST PER DISCHARGE	TOTAL COST ***
Abitibi-Price, Thunder Bay Division	Final Effluent	35,000	G+S/M	\$95,913.00	\$97,617.00
	Point Source Storm Water Effluent		C	\$852.00	
	Point Source Storm Water Effluent		W	\$852.00	
Abitibi-Price Fine Papers Division	Final Effluent	47,000	G+S/M	\$104,509.00	\$106,511.00
	Point Source Storm Water Effluent		D,W,B	\$1,150.00	
	Point Source Storm Water Effluent		W	\$852.00	
Boise-Cascade Canada Ltd., Kenora	Final Effluent	48,800	G+S/M	\$104,509.00	\$105,439.00
	Point Source Storm Water Effluent		T,W,B	\$930.00	
*Quebec And Ontario Paper Company Ltd.	Final Effluent	85,600	G+S/M	\$100,453.00	\$100,453.00
Spruce Falls Power and Paper Company Limited	Final Effluent	87,000	G+S/M	\$104,509.00	\$107,907.00
	Point Source Storm Water Effluent		T	\$122.00	
	Point Source Storm Water Effluent		T,F	\$1,372.00	
	Point Source Storm Water Effluent		T,W,C	\$930.00	
	Point Source Storm Water Effluent		T	\$122.00	
	Point Source Storm Water Effluent		W	\$852.00	
St Marys Paper Inc.	Final Effluent	15,700	G+S/M	\$104,509.00	\$104,509.00
CORRUGATING MILLS					
Domtar Inc., Containerboard Division, Trenton	Final Effluent	3,700	G+C	\$95,913.00	\$99,143.00
	Point Source Storm Water Effluent		T,W	\$930.00	
	Point Source Storm Water Effluent		D,W,R	\$1,150.00	
	Point Source Storm Water Effluent		D,W	\$1,150.00	
MacMillian-Bloedel Ltd.	Black Liquor Overflow	1,790	G+C	\$95,913.00	\$259,693.00
	Clean Water Effluent	5,350	G+C	\$79,777.00	
	Clarifier Overflow	3,620	G+C	\$79,777.00	
	Point Source Storm Water Effluent		W,C	\$852.00	
	Point Source Storm Water Effluent		D,C	\$1,150.00	
	Point Source Storm Water Effluent		W	\$852.00	
	Point Source Storm Water Effluent		F	\$1,372.00	

Cost of Analysis

TABLE 7 (cont)

Cost of Analysis

DEINKING/BOARD/FINE PAPER/TISSUE	DISCHARGE POINT	TOT DAILY VOLUME	MISA CLASS	COST PER DISCHARGE	TOTAL COST ***
Beaver Wood Fibre Co. Ltd.	Final Effluent	13,800	G+D/B/FP/T	\$74,633.00	\$83,573.00
	Spill Pond Overflow	200	CWE	\$8,940.00	
Domtar Inc, Fine Papers Division, St. Catharines	Final Effluent	9,752	G+D/B/FP/T	\$83,229.00	\$83,229.00
E.B. Eddy Forest Products Ltd., Ottawa	Final Effluent	7,950	G+D/B/FP/T	\$83,229.00	\$83,229.00
*Fraser Inc, Thorold	Final Effluent	25,300	G+D/B/FP/T	\$102,821.00	\$102,821.00
Kimberly-Clark of Canada Limited, Huntsville	Final Effluent	425	G+D/B/FP/T	\$83,229.00	\$83,351.00
	Point Source Storm Water Effluent		T	\$122.00	
Kimberly-Clark of Canada Limited, St. Catharines	Final Effluent	10,066	G+D/B/FP/T	\$83,229.00	\$83,229.00
*Strathcona Paper Company, Strathcona	Final Effluent	3,200	G+D/B/FP/T	\$74,633.00	\$83,573.00
	Cooling Water & Filter Plant BW		CWE	\$8,940.00	
Trent Valley Paperboard Mills Division, Trenton	Final Effluent	2,400	G+D/B/FP/T	\$74,633.00	\$119,919.00
	Cooling Water		CWE	\$8,940.00	
	Cooling Water		CWE	\$8,940.00	
	Cooling Water		CWE	\$8,940.00	
	Cooling Water		CWE	\$8,940.00	
	Cooling Water		CWE	\$8,940.00	
	Point Source Storm Water Effluent		R	\$586.00	
TOTAL COST TO INDUSTRY:					\$3,636,823.00
AVERAGE COST PER MILL:					\$134,697.15

Explanation of symbols used.					
G+K	Process effluent general requirements plus Kraft Mill requirements				
G+S/M	Process Effluent general requirements plus Sulphite-Mechanical requirements				
G+C	Process effluent general requirements plus Corrugating Mill requirements				
G+D/B/FP/T	Process effluent general requirements plus Deinking-Board-Fine Paper-Tissue requirements				
CWE	Cooling Water Effluent general requirements				
BWE	Backwash Effluent general requirements				
WDSE	Waste disposal Site Effluent requirements				
B	Point source storm water effluent, bark storage requirements				
C	Point source storm water effluent, chip storage requirements				
D	Point source storm water effluent, disposal site requirements				
F	Point source storm water effluent, coal storage requirements				
R	Point source storm water effluent, waste paper storage requirements				
T	Point source storm water effluent, bulk storage and unloading requirements				
W	Point source storm water effluent, wood storage requirements				
*	Operate a biological treatment plant				
**	Total cost does not include cost of collecting samples or the cost of transporting of samples.				

TABLE 7 (cont)
Cost of Analysis

TABLE 8

Cost of Analysis per Effluent Stream

COST OF ANALYSIS FOR A KRAFT MILL PROCESS
EFFLUENT WITHOUT BIOLOGICAL TREATMENT

TEST	ROUT	QA/QC			COST/TEST	COST
		Dup.	TB	TSB		
DOC/COD	365	12	0	0	\$30.00	\$11,310.00
pH (ATG. 3)	365	12	0	0	\$7.00	\$2,639.00
Conductance (ATG. 7)	365	12	0	0	\$9.00	\$3,393.00
TSS (ATG. 8a)	365	12	0	0	\$15.00	\$5,655.00
BOD5	156	12	0	0	\$25.00	\$4,200.00
AOX	156	12	0	0	\$250.00	\$42,000.00
DHA & DCDHA (ATG. 26)	144	8	4	4	\$133.00	\$21,280.00
Al & Zn (ATG. 9)	40	0	0	0	\$84.00	\$3,360.00
ATG. 4a & 4b	12	4	0	0	\$87.00	\$1,392.00
ATG. 6	12	4	0	0	\$25.00	\$400.00
ATG. 9	12	4	2	2	\$84.00	\$1,680.00
ATG. 12	12	4	2	2	\$26.00	\$520.00
ATG. 15	12	4	0	0	\$30.00	\$480.00
ATG. 16	12	4	2	2	\$240.00	\$4,800.00
ATG. 17	12	4	2	2	\$177.00	\$3,540.00
ATG. 19	12	4	2	2	\$428.00	\$8,560.00
ATG. 20	12	4	2	2	\$246.00	\$4,920.00
ATG. 23	12	4	2	2	\$232.00	\$4,640.00
ATG. 24	12	4	2	0	\$1,228.00	\$22,104.00
ATG. 26	12	4	2	2	\$133.00	\$2,660.00
Toxicity Test	12	0	0	0	\$600.00	\$7,200.00
ATG. 27	2	0	0	0	\$104.00	\$208.00
Open Characterization	2	0	0	0	\$550.00	\$1,100.00

TOTAL COST \$158,041.00

TABLE 8 (cont)

Cost of Analysis per Effluent Stream

COST OF ANALYSIS FOR A KRAFT MILL PROCESS
EFFLUENT WITH BIOLOGICAL TREATMENT

TEST	ROUT	QA/QC			COST/TEST	COST
		Dup.	TB	TSB		
DOC/COD	365	12	0	0	\$30.00	\$11,310.00
pH (ATG. 3)	365	12	0	0	\$7.00	\$2,639.00
Conductance (ATG. 7)	365	12	0	0	\$9.00	\$3,393.00
TSS (ATG. 8a)	365	12	0	0	\$15.00	\$5,655.00
BOD5	156	12	0	0	\$25.00	\$4,200.00
AOX	156	12	0	0	\$250.00	\$42,000.00
DHA & DCDHA (ATG. 26)	144	8	4	4	\$133.00	\$21,280.00
Al & Zn (ATG. 9)	40	0	0	0	\$84.00	\$3,360.00
ATG. 4a & 4b	52	4	0	0	\$87.00	\$4,872.00
ATG. 6	52	4	0	0	\$25.00	\$1,400.00
VSS (ATG. 8b)	-	4	0	0	\$15.00	\$60.00
ATG. 9	12	4	2	2	\$84.00	\$1,680.00
ATG. 12	12	4	2	2	\$26.00	\$520.00
ATG. 15	12	4	0	0	\$30.00	\$480.00
ATG. 16	12	4	2	2	\$240.00	\$4,800.00
ATG. 17	12	4	2	2	\$177.00	\$3,540.00
ATG. 19	12	4	2	2	\$428.00	\$8,560.00
ATG. 20	12	4	2	2	\$246.00	\$4,920.00
ATG. 23	12	4	2	2	\$232.00	\$4,640.00
ATG. 24	12	4	2	0	\$1,228.00	\$22,104.00
ATG. 26	12	4	2	2	\$133.00	\$2,660.00
Toxicity Test	12	0	0	0	\$600.00	\$7,200.00
ATG. 27	2	0	0	0	\$104.00	\$208.00
Open Characteriation	2	0	0	0	\$550.00	\$1,100.00

TOTAL COST \$162,581.00

TABLE 8 (cont)

Cost of Analysis per Effluent Stream

**COST OF ANALYSIS FOR A KRAFT MILL PROCESS
EFFLUENT WITH BIOLOGICAL TREATMENT
NO QA/QC REQUIREMENTS**

TEST	ROUT	QA/QC			COST/TEST	COST
		Dup.	TB	TSB		
DOC/COD	365	0	0	0	\$30.00	\$10,950.00
pH (ATG. 3)	365	0	0	0	\$7.00	\$2,555.00
Conductance (ATG. 7)	365	0	0	0	\$9.00	\$3,285.00
TSS (ATG. 8a)	365	0	0	0	\$15.00	\$5,475.00
BOD5	156	0	0	0	\$25.00	\$3,900.00
AOX	156	0	0	0	\$250.00	\$39,000.00
DHA & DCDHA (ATG. 26)	144	0	0	0	\$133.00	\$19,152.00
Al & Zn (ATG. 9)	40	0	0	0	\$84.00	\$3,360.00
ATG. 4a & 4b	52	0	0	0	\$87.00	\$4,524.00
ATG. 6	52	0	0	0	\$25.00	\$1,300.00
ATG. 9	12	0	0	0	\$84.00	\$1,008.00
ATG. 12	12	0	0	0	\$26.00	\$312.00
ATG. 15	12	0	0	0	\$30.00	\$360.00
ATG. 16	12	0	0	0	\$240.00	\$2,880.00
ATG. 17	12	0	0	0	\$177.00	\$2,124.00
ATG. 19	12	0	0	0	\$428.00	\$5,136.00
ATG. 20	12	0	0	0	\$246.00	\$2,952.00
ATG. 23	12	0	0	0	\$232.00	\$2,784.00
ATG. 24	12	0	0	0	\$1,228.00	\$14,736.00
ATG. 26	12	0	0	0	\$133.00	\$1,596.00
Toxicity Test	12	0	0	0	\$600.00	\$7,200.00
ATG. 27	2	0	0	0	\$104.00	\$208.00
Open Characterization	2	0	0	0	\$550.00	\$1,100.00

TOTAL COST \$135,897.00

TABLE 8 (cont)

Cost of Analysis per Effluent Stream

**COST OF ANALYSIS FOR A SULFITE/MECHANICAL MILL
PROCESS STREAM WITH BIOLOGICAL TREATMENT
AND THE MILL DOES NOT MANUFACTURE
OR USE BLEACHED PULP**

TEST	ROUT	QA/QC			COST/TEST	COST
	MON	Dup.	TB	TSB		
DOC/COD	365	12	0	0	\$30.00	\$11,310.00
pH (ATG. 3)	365	12	0	0	\$7.00	\$2,639.00
Conductance (ATG. 7)	365	12	0	0	\$9.00	\$3,393.00
TSS (ATG. 8a)	365	12	0	0	\$15.00	\$5,655.00
BOD5	156	12	0	0	\$25.00	\$4,200.00
DHA & DCDHA (ATG. 26)	144	8	4	4	\$133.00	\$21,280.00
Al & Zn (ATG. 9)	40	0	0	0	\$84.00	\$3,360.00
ATG. 4a & 4b	52	4	0	0	\$87.00	\$4,872.00
ATG. 6	52	4	0	0	\$25.00	\$1,400.00
VSS (ATG. 8b)	-	4	0	0	\$15.00	\$60.00
ATG. 9	12	4	2	2	\$84.00	\$1,680.00
ATG. 12	12	4	2	2	\$26.00	\$520.00
ATG. 16	12	4	2	2	\$240.00	\$4,800.00
ATG. 17	12	4	2	2	\$177.00	\$3,540.00
ATG. 19	12	4	2	2	\$428.00	\$8,560.00
ATG. 20	12	4	2	2	\$246.00	\$4,920.00
ATG. 23	12	4	2	2	\$232.00	\$4,640.00
ATG. 26	12	4	2	2	\$133.00	\$2,660.00
Toxicity Test	12	0	0	0	\$600.00	\$7,200.00
ATG. 24	2	0	0	0	\$1,228.00	\$2,456.00
ATG. 27	2	0	0	0	\$104.00	\$208.00
Open Characterization	2	0	0	0	\$550.00	\$1,100.00

TOTAL COST \$100,453.00

TABLE 8 (cont)

Cost of Analysis per Effluent Stream

**COST OF ANALYSIS FOR A SULFITE/MECHANICAL MILL
PROCESS STREAM WITHOUT BIOLOGICAL TREATMENT
AND THE MILL DOES NOT MANUFACTURE
OR USE BLEACHED PULP**

TEST	ROUT		QA/Qc		COST/TEST	COST
	MON	Dup.	TB	TSB		
DOC/COD	365	12	0	0	\$30.00	\$11,310.00
pH (ATG. 3)	365	12	0	0	\$7.00	\$2,639.00
Conductance (ATG. 7)	365	12	0	0	\$9.00	\$3,393.00
TSS (ATG. 8a)	365	12	0	0	\$15.00	\$5,655.00
BOD5	156	12	0	0	\$25.00	\$4,200.00
DHA & DCDHA (ATG. 26)	144	8	4	4	\$133.00	\$21,280.00
Al & Zn (ATG. 9)	40	0	0	0	\$84.00	\$3,360.00
ATG. 4a & 4b	12	4	0	0	\$87.00	\$1,392.00
ATG. 6	12	4	0	0	\$25.00	\$400.00
ATG. 9	12	4	2	2	\$84.00	\$1,680.00
ATG. 12	12	4	2	2	\$26.00	\$520.00
ATG. 16	12	4	2	2	\$240.00	\$4,800.00
ATG. 17	12	4	2	2	\$177.00	\$3,540.00
ATG. 19	12	4	2	2	\$428.00	\$8,560.00
ATG. 20	12	4	2	2	\$246.00	\$4,920.00
ATG. 23	12	4	2	2	\$232.00	\$4,640.00
ATG. 26	12	4	2	2	\$133.00	\$2,660.00
Toxicity Test	12	0	0	0	\$600.00	\$7,200.00
ATG. 24	2	0	0	0	\$1,228.00	\$2,456.00
ATG. 27	2	0	0	0	\$104.00	\$208.00
Open Characterization	2	0	0	0	\$550.00	\$1,100.00

TOTAL COST \$95,913.00

TABLE 8 (cont)

Cost of Analysis per Effluent Stream

COST OF ANALYSIS FOR A SULFITE/MECHANICAL MILL
PROCESS STREAM WITHOUT BIOLOGICAL TREATMENT
AND USES BLEACHED PULP

TEST	ROUT	Dup.	QA/Qc		COST/TEST	COST
			TB	TSB		
DOC/COD	365	12	0	0	\$30.00	\$11,310.00
pH (ATG. 3)	365	12	0	0	\$7.00	\$2,639.00
Conductance (ATG. 7)	365	12	0	0	\$9.00	\$3,393.00
TSS (ATG. 8a)	365	12	0	0	\$15.00	\$5,655.00
BOD5	156	12	0	0	\$25.00	\$4,200.00
DHA & DCDHA (ATG. 26)	144	8	4	4	\$133.00	\$21,280.00
Al & Zn (ATG. 9)	40	0	0	0	\$84.00	\$3,360.00
ATG. 4a & 4b	12	4	0	0	\$87.00	\$1,392.00
ATG. 6	12	4	0	0	\$25.00	\$400.00
ATG. 9	12	4	2	2	\$84.00	\$1,680.00
ATG. 12	12	4	2	2	\$26.00	\$520.00
ATG. 16	12	4	2	2	\$240.00	\$4,800.00
ATG. 17	12	4	2	2	\$177.00	\$3,540.00
ATG. 19	12	4	2	2	\$428.00	\$8,560.00
ATG. 20	12	4	2	2	\$246.00	\$4,920.00
ATG. 23	12	4	2	2	\$232.00	\$4,640.00
ATG. 26	12	4	2	2	\$133.00	\$2,660.00
Toxicity Test	12	0	0	0	\$600.00	\$7,200.00
ATG. 24	6	2	1	0	\$1,228.00	\$11,052.00
ATG. 27	2	0	0	0	\$104.00	\$208.00
Open Characterization	2	0	0	0	\$550.00	\$1,100.00

TOTAL COST \$104,509.00

TABLE 8 (cont)

Cost of Analysis per Effluent Stream

**COST OF ANALYSIS FOR A SULFITE/MECHANICAL MILL
PROCESS STREAM WITHOUT BIOLOGICAL TREATMENT
AND USES BLEACHED PULP
NO QA/QC REQUIREMENTS**

TEST	ROUT	QA/Qc			COST/TEST	COST
		Dup.	TB	TSB		
	MON					
DOC/COD	365	0	0	0	\$30.00	\$10,950.00
pH (ATG. 3)	365	0	0	0	\$7.00	\$2,555.00
Conductance (ATG. 7)	365	0	0	0	\$9.00	\$3,285.00
TSS (ATG. 8a)	365	0	0	0	\$15.00	\$5,475.00
BOD5	156	0	0	0	\$25.00	\$3,900.00
DHA & DCDHA (ATG. 26)	144	0	0	0	\$133.00	\$19,152.00
Al & Zn (ATG. 9)	40	0	0	0	\$84.00	\$3,360.00
ATG. 4a & 4b	12	0	0	0	\$87.00	\$1,044.00
ATG. 6	12	0	0	0	\$25.00	\$300.00
ATG. 9	12	0	0	0	\$84.00	\$1,008.00
ATG. 12	12	0	0	0	\$26.00	\$312.00
ATG. 16	12	0	0	0	\$240.00	\$2,880.00
ATG. 17	12	0	0	0	\$177.00	\$2,124.00
ATG. 19	12	0	0	0	\$428.00	\$5,136.00
ATG. 20	12	0	0	0	\$246.00	\$2,952.00
ATG. 23	12	0	0	0	\$232.00	\$2,784.00
ATG. 26	12	0	0	0	\$133.00	\$1,596.00
Toxicity Test	12	0	0	0	\$600.00	\$7,200.00
ATG. 24	6	2	1	0	\$1,228.00	\$11,052.00
ATG. 27	2	0	0	0	\$104.00	\$208.00
Open Characterization	2	0	0	0	\$550.00	\$1,100.00

TOTAL COST \$88,373.00

TABLE 8 (cont)

Cost of Analysis per Effluent Stream

COST OF ANALYSIS FOR A CORRUGATING MILL PROCESS STREAM
THAT DOES NOT USE OR MANUFACTURE BLEACHED PULP

TEST	ROUT	QA/QC			COST/TEST	COST
	MON	Dup.	TB	TSB		
DOC/COD	365	12	0	0	\$30.00	\$11,310.00
pH (ATG. 3)	365	12	0	0	\$7.00	\$2,639.00
Conductance (ATG. 7)	365	12	0	0	\$9.00	\$3,393.00
TSS (ATG. 8a)	365	12	0	0	\$15.00	\$5,655.00
BOD5	156	12	0	0	\$25.00	\$4,200.00
DHA & DCDHA (ATG. 26)	144	8	4	4	\$133.00	\$21,280.00
Al & Zn (ATG. 9)	40	0	0	0	\$84.00	\$3,360.00
ATG. 4a & 4b	12	4	0	0	\$87.00	\$1,392.00
ATG. 6	12	4	0	0	\$25.00	\$400.00
ATG. 9	12	4	2	2	\$84.00	\$1,680.00
ATG. 12	12	4	2	2	\$26.00	\$520.00
ATG. 16	12	4	2	2	\$240.00	\$4,800.00
ATG. 17	12	4	2	2	\$177.00	\$3,540.00
ATG. 19	12	4	2	2	\$428.00	\$8,560.00
ATG. 20	12	4	2	2	\$246.00	\$4,920.00
ATG. 23	12	4	2	2	\$232.00	\$4,640.00
ATG. 26	12	4	2	2	\$133.00	\$2,660.00
Toxicity Test	12	0	0	0	\$600.00	\$7,200.00
ATG. 24	2	0	0	0	\$1,228.00	\$2,456.00
ATG. 27	2	0	0	0	\$104.00	\$208.00
Open Characterization	2	0	0	0	\$550.00	\$1,100.00

TOTAL COST \$95,913.00

TABLE 8 (cont)

Cost of Analysis per Effluent Stream

**COST OF ANALYSIS FOR A CORRUGATING MILL PROCESS STREAM
THAT DOES NOT USE OR MANUFACTURE BLEACHED PULP
NO QA/QC REQUIREMENTS**

TEST	ROUT	QA/QC			COST/TEST	COST
		Dup.	TB	TSB		
DOC/COD	365	0	0	0	\$30.00	\$10,950.00
pH (ATG. 3)	365	0	0	0	\$7.00	\$2,555.00
Conductance (ATG. 7)	365	0	0	0	\$9.00	\$3,285.00
TSS (ATG. 8a)	365	0	0	0	\$15.00	\$5,475.00
BOD5	156	0	0	0	\$25.00	\$3,900.00
DHA & DCDHA (ATG. 26)	144	0	0	0	\$133.00	\$19,152.00
Al & Zn (ATG. 9)	40	0	0	0	\$84.00	\$3,360.00
ATG. 4a & 4b	12	0	0	0	\$87.00	\$1,044.00
ATG. 6	12	0	0	0	\$25.00	\$300.00
ATG. 9	12	0	0	0	\$84.00	\$1,008.00
ATG. 12	12	0	0	0	\$26.00	\$312.00
ATG. 16	12	0	0	0	\$240.00	\$2,880.00
ATG. 17	12	0	0	0	\$177.00	\$2,124.00
ATG. 19	12	0	0	0	\$428.00	\$5,136.00
ATG. 20	12	0	0	0	\$246.00	\$2,952.00
ATG. 23	12	0	0	0	\$232.00	\$2,784.00
ATG. 26	12	0	0	0	\$133.00	\$1,596.00
Toxicity Test	12	0	0	0	\$600.00	\$7,200.00
ATG. 24	2	0	0	0	\$1,228.00	\$2,456.00
ATG. 27	2	0	0	0	\$104.00	\$208.00
Open Characterization	2	0	0	0	\$550.00	\$1,100.00

TOTAL COST \$79,777.00

TABLE 8 (cont)

Cost of Analysis per Effluent Stream

COST OF ANALYSIS FOR A DEINKING-BOARD-FINE PAPER-TISSUE
MILL PROCESS STREAM

TEST	ROUT	QA/QC			COST/TEST	COST
		Dup.	TB	TSB		
DOC/COD	365	12	0	0	\$30.00	\$11,310.00
pH (ATG. 3)	365	12	0	0	\$7.00	\$2,639.00
Conductance (ATG. 7)	365	12	0	0	\$9.00	\$3,393.00
TSS (ATG. 8a)	365	12	0	0	\$15.00	\$5,655.00
BOD5	156	12	0	0	\$25.00	\$4,200.00
Al & Zn (ATG. 9)	40	0	0	0	\$84.00	\$3,360.00
ATG. 4a & 4b	12	4	0	0	\$87.00	\$1,392.00
ATG. 6	12	4	0	0	\$25.00	\$400.00
ATG. 9	12	4	2	2	\$84.00	\$1,680.00
ATG. 12	12	4	2	2	\$26.00	\$520.00
ATG. 16	12	4	2	2	\$240.00	\$4,800.00
ATG. 17	12	4	2	2	\$177.00	\$3,540.00
ATG. 19	12	4	2	2	\$428.00	\$8,560.00
ATG. 20	12	4	2	2	\$246.00	\$4,920.00
ATG. 23	12	4	2	2	\$232.00	\$4,640.00
ATG. 26	12	4	2	2	\$133.00	\$2,660.00
Toxicity Test	12	0	0	0	\$600.00	\$7,200.00
ATG. 24	6	2	1	0	\$1,228.00	\$11,052.00
ATG. 27	2	0	0	0	\$104.00	\$208.00
Open Characterization	2	0	0	0	\$550.00	\$1,100.00

TOTAL COST \$83,229.00

TABLE 8 (cont)

Cost of Analysis per Effluent Stream

**COST OF ANALYSIS FOR A DEINKING/BOARD/FINE PAPER/TISSUE
MILL PROCESS STREAM WITH BIOLOGICAL TREATMENT
USING CHLORINE OR CHLORINE DERIVATIVES FOR THE
BRIGHTENING OF FIBRE**

TEST	ROUT	QA/QC			COST/TEST	COST
		Dup.	TB	TSB		
DOC/COD	365	12	0	0	\$30.00	\$11,310.00
pH (ATG. 3)	365	12	0	0	\$7.00	\$2,639.00
Conductance (ATG. 7)	365	12	0	0	\$9.00	\$3,393.00
TSS (ATG. 8a)	365	12	0	0	\$15.00	\$5,655.00
BOD5	156	12	0	0	\$25.00	\$4,200.00
Al & Zn (ATG. 9)	40	0	0	0	\$84.00	\$3,360.00
ATG. 4a & 4b	52	4	0	0	\$87.00	\$4,872.00
ATG. 6	52	4	0	0	\$25.00	\$1,400.00
VSS (ATG. 8b)	-	4	0	0	\$15.00	\$60.00
ATG. 9	12	4	2	2	\$84.00	\$1,680.00
ATG. 12	12	4	2	2	\$26.00	\$520.00
ATG. 16	12	4	2	2	\$240.00	\$4,800.00
ATG. 17	12	4	2	2	\$177.00	\$3,540.00
ATG. 19	12	4	2	2	\$428.00	\$8,560.00
ATG. 20	12	4	2	2	\$246.00	\$4,920.00
ATG. 23	12	4	2	2	\$232.00	\$4,640.00
ATG. 24	12	4	2	0	\$1,228.00	\$22,104.00
ATG. 26	12	4	2	2	\$133.00	\$2,660.00
AOX	12	4	0	0	\$250.00	\$4,000.00
Toxicity Test	12	0	0	0	\$600.00	\$7,200.00
ATG. 27	2	0	0	0	\$104.00	\$208.00
Open Characterization	2	0	0	0	\$550.00	\$1,100.00

TOTAL COST \$102,821.00

TABLE 8 (cont)

Cost of Analysis per Effluent Stream

**COST OF ANALYSIS FOR A DEINKING-BOARD-FINE PAPER-TISSUE
MILL PROCESS STREAM WHERE THE MILL DOES NOT USE BLEACHED PULP**

TEST	ROUT	QA/QC			COST/TEST	COST
		Dup.	TB	TSB		
DOC/COD	365	12	0	0	\$30.00	\$11,310.00
pH (ATG. 3)	365	12	0	0	\$7.00	\$2,639.00
Conductance (ATG. 7)	365	12	0	0	\$9.00	\$3,393.00
TSS (ATG. 8a)	365	12	0	0	\$15.00	\$5,655.00
BOD5	156	12	0	0	\$25.00	\$4,200.00
Al & Zn (ATG. 9)	40	0	0	0	\$84.00	\$3,360.00
ATG. 4a & 4b	12	4	0	0	\$87.00	\$1,392.00
ATG. 6	12	4	0	0	\$25.00	\$400.00
ATG. 9	12	4	2	2	\$84.00	\$1,680.00
ATG. 12	12	4	2	2	\$26.00	\$520.00
ATG. 16	12	4	2	2	\$240.00	\$4,800.00
ATG. 17	12	4	2	2	\$177.00	\$3,540.00
ATG. 19	12	4	2	2	\$428.00	\$8,560.00
ATG. 20	12	4	2	2	\$246.00	\$4,920.00
ATG. 23	12	4	2	2	\$232.00	\$4,640.00
ATG. 26	12	4	2	2	\$133.00	\$2,660.00
Toxicity Test	12	0	0	0	\$600.00	\$7,200.00
ATG. 24	2	0	0	0	\$1,228.00	\$2,456.00
ATG 27	2	0	0	0	\$104.00	\$208.00
Open Characterization	2	0	0	0	\$550.00	\$1,100.00

TOTAL COST \$74,633.00

TABLE 8 (cont)**Cost of Analysis per Effluent Stream****COST OF ANALYSIS FOR A COOLING WATER EFFLUENT**

TEST	FREQ	COST/TEST	COST
DOC/COD	12	\$30.00	\$360.00
pH (ATG. 3)	12	\$7.00	\$84.00
Spec. Conduct (ATG. 7)	12	\$9.00	\$108.00
TSS (ATG. 8a)	12	\$15.00	\$180.00
Cr/Zn (ATG. 9)	12	\$84.00	\$1,008.00
Toxicity Test	12	\$600.00	\$7,200.00

TOTAL COST **\$8,940.00****COST OF ANALYSIS FOR A WASTE DISPOSAL
SITE EFFLUENT**

TEST	FREQ	COST/TEST	COST
BOD5	12	\$25.00	\$300.00
pH (ATG. 3)	12	\$7.00	\$84.00
ATG. 4a	12	\$87.00	\$1,044.00
ATG. 6	12	\$25.00	\$300.00
TSS (ATG. 8a)	12	\$15.00	\$180.00
ATG. 9	12	\$84.00	\$1,008.00
ATG. 12	12	\$26.00	\$312.00
ATG. 20	12	\$246.00	\$2,952.00
ATG. 26	12	\$133.00	\$1,596.00

TOTAL COST **\$7,776.00**

TABLE 8 (cont)

Cost of Analysis per Effluent Stream

COST OF ANALYSIS FOR A BACKWASH EFFLUENT

TEST		FREQ	COST/TEST	COST
DOC/COD		12	\$30.00	\$360.00
pH	(ATG. 3)	12	\$7.00	\$84.00
TSS	(ATG. 8a)	12	\$15.00	\$180.00
Al	(ATG. 9)	12	\$84.00	\$1,008.00

TOTAL COST \$1,632.00

COST OF ANALYSIS FOR AN EMERGENCY OVERFLOW EFFLUENT

TEST		FREQ	COST/TEST	COST
DOC/COD		1	\$30.00	\$30.00
pH	(ATG. 3)	1	\$7.00	\$7.00
Spec. Conduct	(ATG. 7)	1	\$9.00	\$9.00
TSS	(ATG. 8a)	1	\$15.00	\$15.00

TOTAL COST \$61.00

TABLE 8 (cont)

Cost of Analysis per Effluent Stream

COST OF ANALYSIS FOR POINT SOURCE STORM WATER EFFLUENTS

Bark Storage Pile

TEST	FREQ	COST/TEST	COST
BOD5	2	\$25.00	\$50.00
pH (ATG. 3)	2	\$7.00	\$14.00
TSS (ATG 8a)	2	\$15.00	\$30.00
ATG 20	2	\$246.00	\$492.00
ATG 26	2	\$133.00	\$266.00

TOTAL COST \$852.00

Bulk Storage and Unloading Area

TEST	FREQ	COST/TEST	COST
DOC/COD	2	\$30.00	\$60.00
pH (ATG. 3)	2	\$7.00	\$14.00
Spec. Conduct	2	\$9.00	\$18.00
TSS (ATG 8a)	2	\$15.00	\$30.00

TOTAL COST \$122.00

Chip Storage Pile

TEST	FREQ	COST/TEST	COST
BOD5	2	\$25.00	\$50.00
pH (ATG. 3)	2	\$7.00	\$14.00
TSS (ATG 8a)	2	\$15.00	\$30.00
ATG 20	2	\$246.00	\$492.00
ATG 26	2	\$133.00	\$266.00

TOTAL COST \$852.00

Coal Storage Pile

TEST	FREQ	COST/TEST	COST
DOC/COD	2	\$30.00	\$60.00
pH (ATG. 3)	2	\$7.00	\$14.00
ATG. 4a	2	\$87.00	\$174.00
Spec. Conduct	2	\$9.00	\$18.00
TSS (ATG 8a)	2	\$15.00	\$30.00
ATG 9	2	\$84.00	\$168.00
ATG 12	2	\$26.00	\$52.00
ATG 19	2	\$428.00	\$856.00

TOTAL COST \$1,372.00

TABLE 8 (cont)

Cost of Analysis per Effluent Stream

COST OF ANALYSIS FOR POINT SOURCE STORM WATER EFFLUENTS (cont)

Waste Disposal Site

TEST	FREQ	COST/TEST	COST
DOC/COD	2	\$30.00	\$60.00
pH (ATG. 3)	2	\$7.00	\$14.00
Spec. Conduct	2	\$9.00	\$18.00
TSS (ATG 8a)	2	\$15.00	\$30.00
ATG 9	2	\$84.00	\$168.00
ATG 12	2	\$26.00	\$52.00
ATG 20	2	\$246.00	\$492.00
ATG 26	2	\$133.00	\$266.00

TOTAL COST \$1,100.00

Waste Paper Storage

TEST	FREQ	COST/TEST	COST
BOD5	2	\$25.00	\$50.00
pH (ATG. 3)	2	\$7.00	\$14.00
TSS (ATG 8a)	2	\$15.00	\$30.00
ATG 20	2	\$246.00	\$492.00

TOTAL COST \$586.00

Wood Storage

TEST	FREQ	COST/TEST	COST
BOD5	2	\$25.00	\$50.00
pH (ATG. 3)	2	\$7.00	\$14.00
TSS (ATG 8a)	2	\$15.00	\$30.00
ATG 20	2	\$246.00	\$492.00
ATG 26	2	\$133.00	\$266.00

TOTAL COST \$852.00

PART III

THE DRAFT EFFLUENT MONITORING REGULATION
FOR THE PULP AND PAPER SECTOR.

**REGULATION MADE UNDER THE
ENVIRONMENTAL PROTECTION ACT
EFFLUENT MONITORING - PULP AND PAPER SECTOR**

DEFINITIONS

1.-(1) In this Regulation;

"ATG" means Analytical Test Group;

"backwash effluent" means the effluent discharged from any intake water treatment operation directly to a surface watercourse, separate from any other effluent but does not include any effluent from intake water screening operations;

"backwash effluent stream" means the backwash effluent that flows through an open or closed channel;

"backwash effluent sampling point" means a location in a backwash effluent stream where samples of the backwash effluent are collected;

"bi-monthly" means on at least one operating day every two months, with at least six weeks between successive sampling;

"biologically treated effluent" means the effluent that is discharged from a biological treatment process;

"bleached pulp" means fibre that has been bleached or brightened using chlorine or chlorine derivatives;

"catchment area" means an area of land on the mill site which collects precipitation and has one or more of the following land uses:

1. bark storage;
2. bulk storage and unloading;
3. chip storage;
4. coal storage;
5. waste disposal;
6. waste paper storage;
7. wood storage;

"combined sample" means a sample made up of corresponding samples from two or more effluent sampling points on contributory streams, which samples have been combined proportional to flow;

"composite sample" means a volume of effluent made up of eight or more sub-samples that have been collected from an effluent sampling point over the course of an operating day and that have been combined automatically or manually;

"contributory stream" means any stream that combines with one or more other streams prior to discharging directly to a surface watercourse;

"cooling water effluent" means cooling water discharged directly to a surface watercourse as an effluent;

"cooling water effluent stream" means the cooling water effluent that flows through an open or closed channel;

"cooling water effluent sampling point" means a location in a cooling water effluent stream where samples of the cooling water effluent are collected;

"effluent" means any liquid and associated material discharged directly to a surface watercourse;

"effluent sampling point" means a location in an effluent stream where samples of the effluent are collected;

"emergency overflow" means the wastewater that is diverted around a wastewater treatment system prior to discharging directly to a surface watercourse as an effluent;

"emergency overflow stream" means the emergency overflow that flows through an open or closed channel;

"emergency overflow sampling point" means a location in an emergency overflow stream where samples of the emergency overflow are collected;

"General Effluent Monitoring Regulation" means Ontario Regulation # 695/88

"grab sample" means a volume of effluent of at least one hundred milliliters which is collected over a period not exceeding fifteen minutes and transferred as soon as is practicable to the appropriate laboratory sample container set out in column 2 of Schedule 2 of the General Effluent Monitoring Regulation or in column 2 of Schedule 1 of this Regulation;

"intake water" means the water which is taken in by the direct discharger for the purposes of processing or cooling and does not include water that is unused and is diverted back to the source of water or water that is discharged with the backwash effluent from any intake water treatment operations;

"mill" means the buildings, associated equipment and processes which are located on the mill site and which are used in the manufacture of pulp and paper products, wastewater treatment and waste disposal;

"mill site" means the developed property on which a mill is located;

"monthly" means on at least one operating day in each month, with at least two weeks between successive sampling;

"open characterization" means the analysis of a sample to provisionally identify and determine the approximate quantity of chemical substances in the chemical classes under ATG 28a and 28b in Schedule B;

"operating day" means a twenty four hour period established by the direct discharger in the initial report;

"point source storm water effluent" means the storm water collected by a catchment area and which is discharged directly to a surface watercourse;

"point source storm water effluent stream " means the point source storm water effluent that flows through an open or closed channel;

"process effluent sampling point" means a location in a process effluent stream where samples of the process effluent are collected;

"sample" means a collected volume of effluent and includes a combined sample, composite sample or one or more grab samples;

"sample preparation area" means a location on the mill site at which samples are prepared in accordance with the requirements of the General Effluent Monitoring Regulation for storage or shipment to an analytical laboratory;

"sector characterization" means the analysis of a sample or samples to identify and quantify the chemical substances in the chemical classes under ATG's numbered 9, 12, 16, 17, 19, 20, 23 and 26 of Schedule B;

"semi-annually" means on at least one operating day twice per year, with at least six months between successive sampling;

"stream" means any liquid and associated material that flows through an open or closed channel;

"thrice weekly" means on at least three separate operating days in each week;

"toxicity test" means performing a fish toxicity test as described in the Ontario Ministry of the Environment publication entitled "Protocol to Determine the Acute Lethality of Liquid Effluents to Fish" dated July, 1983, and an acute Daphnia magna lethality test as described in the Ontario Ministry of the Environment publication entitled "Daphnia magna Acute Lethality Toxicity Test Protocol", dated April, 1988;

"travelling blank sample" means a quality control sample of uncontaminated water that accompanies a set of sample containers from the laboratory to the sample preparation area or sampling point where it is opened, preserved, resealed and returned to the laboratory with the set of samples for analysis;

"travelling spiked blank sample" means a quality control sample of uncontaminated water to which a certain recorded quantity of standard solution and appropriate preservative is added in the laboratory a maximum of twenty-four hours before

accompanying a set of sample containers from the laboratory to the sample preparation area or sampling point and back, unopened, to the laboratory with the set of samples for analysis;

"waste" in this Regulation means ashes, garbage, refuse, domestic waste, industrial waste, wood wastes and bark but does not include wood wastes and bark which are being stored for use as fuel at a later date;

"waste disposal site" in this Regulation means an area of land on the mill site established or operated to accept waste generated by the direct discharger;

"waste disposal site effluent" means any liquid that runs off a waste disposal site and that discharges directly to a surface watercourse;

"waste disposal site effluent sampling point" means a location in a waste disposal site effluent stream where samples of the waste disposal site effluent are collected;

"weekly" means on a least one operating day in each week, with at least two days between successive sampling.

(2) The definitions in section 1 of the General Effluent Monitoring Regulation that are not redefined in this Regulation apply to this Regulation.

(3) In construing the General Effluent Monitoring Regulation, "plant" means each of the mills named in subsection 3(1).

PURPOSE

2. The purpose of this Regulation is to establish a data base on effluent quality in the Pulp and Paper Sector that, along with other pertinent information, will be used in the development of effluent limits for that sector.

APPLICATION

3.-(1) This Regulation applies only with respect to the following mills in the following designated categories:

SULPHATE (KRAFT) CATEGORY

Boise Cascade Canada Ltd., Fort Frances

Canadian Pacific Forest Products Limited, Dryden

Canadian Pacific Forest Products Limited, Thunder Bay

Domtar Inc., Fine Papers Division, Cornwall

Domtar Inc., Containerboard Division, Red Rock

E.B. Eddy Forest Products Ltd., Espanola

James River-Marathon Ltd., Marathon

Kimberly-Clark of Canada Limited, Terrace Bay

Waferboard Corporation Ltd., Mallette Kraft Pulp and Power Division,
Smooth Rock Falls

SULPHITE-MECHANICAL CATEGORY

Abitibi-Price Inc., Thunder Bay Division, Thunder Bay

Abitibi-Price Inc., Fort William Division, Thunder Bay

Abitibi-Price Inc., Fine Paper Division, Thunder Bay

Abitibi-Price Inc., Iroquois Falls Division, Iroquois Falls

Boise Cascade Canada Ltd., Kenora

Quebec & Ontario Paper Company Ltd., Thorold

St. Marys Paper Inc., Sault Ste Marie

Spruce Falls Power and Paper Company Limited, Kapuskasing

CORRUGATING CATEGORY

Domtar Inc., Containerboard Division, Trenton

MacMillan Bloedel Limited, Sturgeon Falls

DEINKING-BOARD-FINE PAPERS-TISSUE CATEGORY

DEINKING

Fraser Inc., Thorold

BOARD

Beaver Wood Fibre Co. Ltd., Thorold

Strathcona Paper Company, A Division of Roman Corporation Limited,
Napanee

Paperboard Industries Corporation, Trent Valley Paperboard Mills Division,
Trenton

FINE PAPERS

Domtar Inc., Fine Papers Division, St. Catharines

E.B. Eddy Forest Products Ltd., Ottawa

TISSUE

Kimberly-Clark of Canada Limited, St Catharines

Kimberly-Clark of Canada Limited, Huntsville

(2) This Regulation is a Sectoral Effluent Monitoring Regulation within the meaning of the General Effluent Monitoring Regulation.

(3) Each direct discharger shall carry out the monitoring obligations, including the sampling, analysis, toxicity testing, flow measurement, recording and reporting obligations of this Regulation in accordance with the General Effluent Monitoring Regulation, except where modified by this Regulation.

(4) An obligation on a person to do a thing under this Regulation is discharged if another person has done it on the direct discharger's behalf.

(5) Each direct discharger shall notify the Director in writing of any change of name or ownership of its mill within 30 days after this Regulation comes into force or within 30 days after any such change.

(6) On days when the mill is not operating and is not discharging process effluent the direct discharger is exempted from the sampling requirements of this Regulation.

MONITORING

4.-(1) Subject to the categories as designated in subsection 3(1), each direct discharger shall monitor its effluents in accordance with the requirements of Schedule A.

(2) Combined samples may be collected for the purpose of monitoring an effluent provided that the direct discharger satisfies the Director in the initial report required under subsection 29(1) that:

- 1) it is impracticable to directly collect samples of that effluent in accordance with the requirements of the General Effluent Monitoring Regulation; or
- 2) the chemical characteristics or toxicity of that effluent are different from the chemical characteristics or toxicity of each of the two or more separate contributory streams which combine to make up that effluent.

ANALYSIS

5.-(1) Subject to subsection (2), where a direct discharger is required to analyze for an ATG in Schedule A, the direct discharger shall analyze for each of the parameters in column 3 of Schedule B for that respective ATG.

(2) Where a direct discharger analyzes for individual parameters within an ATG in Schedule A, the direct discharger shall use the Sample Preparation Method Principles in Column 3 and the Instrumental Measurement Method Principles in Column 4 or the Alternate Instrumental Measurement Method Principles in Column 5, for the respective ATG, either parts A and B in Schedule 3 of the General Effluent Monitoring Regulation or in Schedule 2 of this Regulation and is exempted from analyzing for the remaining parameters within that ATG.

SAMPLING POINTS

6.-(1) Subject to subsections (4) and (5), each direct discharger shall establish sampling points that permit the collection of samples which are representative of the effluent on each;

1. process effluent stream;
2. cooling water effluent stream;
3. waste disposal site effluent stream;
4. backwash effluent stream;
5. emergency overflow stream;

except where such streams do not exist at a mill.

(2) Subject to subsection (3), each direct discharger shall establish sampling points that permit the collection of samples of point source storm water effluent from each point source storm water effluent stream that discharges directly to a surface watercourse through an open or closed channel.

(3) Where a direct discharger has more than one catchment area with a land use for the storage of either bark, chips, waste paper or wood, that discharger is exempted from establishing sampling points for those catchment areas as required under subsection (2) but instead, shall establish sampling points only on point source storm water effluent streams that originate from the largest catchment areas for the respective land uses.

(4) Where a direct discharger is permitted to collect a combined sample, the discharger shall establish sampling points on each contributory stream being sampled for the purpose of collecting the combined sample, and the discharger is exempted from the requirement under subsection (1) of establishing a sampling point on the single effluent stream into which the contributory streams combine.

(5) Each direct discharger shall use the sampling points established under subsections (1), (2), (3) and (4) for sampling required by this Regulation, except that a direct discharger may use an alternate sampling point or delete an established sampling point where approval in writing is received from the Director.

PROCESS EFFLUENTS - GENERAL REQUIREMENTS

DAILY

7.-(1) During each operating day, each direct discharger shall collect composite samples sufficient to perform all of the analyses required by subsection (3), from each process effluent sampling point of that discharger.

(2) Subsection (1) does not apply in respect of any day in which a sufficient volume of sample cannot be collected because of the collection of inspection samples.

(3) Each direct discharger shall analyze the composite samples collected under subsection (1) for the ATG's set forth in subsection 1(1) of Schedule A.

THRICE WEEKLY

8.-(1) Each direct discharger shall collect composite samples thrice weekly, sufficient to perform all of the analyses required by subsection (2), from each process effluent sampling point of that discharger.

(2) Each direct discharger shall analyze the composite samples collected under subsection (1) for the ATG set forth in subsection 1(2) of Schedule A.

WEEKLY

9.-(1) Each direct discharger shall collect composite samples weekly, sufficient to perform all of the analyses required by subsection (2), from each process effluent sampling point of that discharger.

(2) Each direct discharger shall analyze the composite samples collected under subsection (1) for the parameters set forth in subsection 1(3) of Schedule A.

MONTHLY

10.-(1) Each direct discharger shall collect composite samples monthly, sufficient to perform all of the analyses required by subsection (2), from each process effluent sampling point of that discharger.

(2) Subject to subsection 11(3), each direct discharger shall analyze the samples collected under subsection (1) for the ATG's set forth in subsection 1(4) of Schedule A except for ATG's 16 and 17.

(3) On the same day as composite samples are collected under subsection (1), each direct discharger shall collect grab samples monthly, in accordance with the sampling requirements of subsection 3(8) of the General Effluent Monitoring Regulation, sufficient to perform all of the analyses required by subsection (4), from each process effluent sampling point of that discharger.

(4) Subject to subsection 11(4), each direct discharger shall analyze the samples collected under subsection (3) only for ATG's 16 and 17 of the ATG's set forth in subsection 1(4) of Schedule A.

SEMI-ANNUALLY

11.-(1) Each direct discharger shall collect composite samples semi-annually, sufficient to perform all of the analyses required by subsection (2), from each process effluent sampling point of that discharger.

(2) Each direct discharger shall analyze the composite samples collected under subsection (1) for the ATG set forth in clause 1(5)(a) of Schedule A.

(3) Each direct discharger shall semi-annually, using composite samples collected under subsection 10(1), perform an open characterization for extractable organic compounds as set forth in sub-clause 1(5)(b)(i) of Schedule A.

(4) Each direct discharger shall semi-annually, using grab samples collected under subsection 10(3), perform an open characterization for volatile organic compounds as set forth in sub-clause 1(5)(b)(ii) of Schedule A.

(5) Each direct discharger shall collect composite samples semi-annually, sufficient to perform all the analyses required by subsection (6), from each process effluent sampling point of that discharger.

(6) Each direct discharger shall analyze the composite samples collected under subsection (5) for the ATG set forth in clause 1(5)(c) of Schedule A.

PROCESS EFFLUENTS - SPECIFIC REQUIREMENTS

SULPHATE (KRAFT)

THRICE WEEKLY

12.-(1) Subject to subsection (2), each direct discharger in the Sulphate (Kraft) Category shall collect composite samples thrice weekly, sufficient to perform all of the analyses required by subsection (3), from each process effluent sampling point of that discharger.

(2) Each direct discharger in the Sulphate (Kraft) Category shall ensure that at least once in each month, composite samples collected under subsection (1) are collected on the same day as composite samples are collected under subsection 10(1).

(3) Each direct discharger in the Sulphate (Kraft) Category shall analyze the composite samples collected under subsection (1) for the ATG's and parameter set forth in subsection 2(1) of Schedule A.

MONTHLY

13.-(1) On the same day as composite samples are collected under subsection 10(1), each direct discharger in the Sulphate (Kraft) Category shall collect grab samples monthly, in accordance with the sampling requirements of subsection 3.-(8) of the General Effluent Monitoring Regulation, sufficient to perform all of the analyses required by subsection (2), from each process effluent sampling point of that discharger.

(2) Each direct discharger in the Sulphate (Kraft) Category shall analyze the grab samples collected under subsection (1) for the ATG set forth in clause 2(2)(a) of Schedule A.

(3) Each direct discharger in the Sulphate (Kraft) Category shall collect composite samples monthly and not necessarily on the same day as composite samples are collected as required by subsection 10(1), sufficient to perform all of the analyses required by subsection (4), from each process effluent sampling point of that discharger.

(4) Each direct discharger in the Sulphate (Kraft) Category shall analyze the composite samples collected under subsection (3) for the ATG set forth in clause 2(2)(b) of Schedule A.

SULPHITE-MECHANICAL & CORRUGATING

THRICE WEEKLY

14.-(1) Each direct discharger in the Sulphite-Mechanical Category and in the Corrugating Category shall collect composite samples thrice weekly, sufficient to perform all of the analyses required by subsection (2), from each process effluent sampling point of that discharger.

(2) Each direct discharger in the Sulphite-Mechanical Category and in the Corrugating Category shall analyze the composite samples collected under subsection (1) for the parameter set forth in subsection 3(1) of Schedule A.

DEINKING-BOARD-FINE PAPER-TISSUE

MONTHLY

15.-(1) Subject to subsection (2), each direct discharger in the Deinking-Board-Fine Paper-Tissue Category shall collect composite samples monthly and on the same day as composite samples are collected under subsection 10(1), sufficient to perform all of the analyses required by subsection (3), from each process effluent sampling point of that discharger.

(2) A direct discharger that does not use chlorine or chlorine derivatives for bleaching or brightening of fibre is exempted from the requirement of collecting composite samples under subsection (1).

(3) Each direct discharger in the Deinking-Board-Fine Paper-Tissue Category shall analyze the composite samples collected under subsection (1) for the ATG set forth in clause 4(1)(a) of Schedule A.

(4) Subject to subsection (5), each direct discharger in the Deinking-Board-Fine Paper-Tissue Category shall collect composite samples monthly and not necessarily on the same day as composite samples are collected under subsection 10(1), sufficient to perform all of the analyses required by subsection (6), from each process effluent sampling point of that discharger.

(5) A direct discharger that does not use chlorine or chlorine derivatives for bleaching or brightening of fibre is exempted from the requirement of collecting composite samples under subsection (4).

(6) Each direct discharger in the Deinking-Board-Fine Paper-Tissue Category shall analyze the composite samples collected under subsection (4) for the ATG set forth in clause 4(1)(b) of Schedule A.

MILLS OPERATING BIOLOGICAL TREATMENT PROCESSES

WEEKLY

16.-(1) Each direct discharger that operates a biological treatment process shall collect composite samples weekly, sufficient to perform all of the analyses required by subsection (2), from each process effluent sampling point of that discharger through which biologically treated effluent passes.

(2) Each direct discharger shall analyze the composite samples of biologically treated effluent collected under subsection (1) for the ATG's set forth in subsection 5(1) of schedule A, except that;

- (a) a direct discharger is not required to analyze the composite samples collected under subsection (1) for ATG's 4a and 4b of Schedule B if the direct discharger does not add nitrogen compounds to the biological treatment process; and
- (b) a direct discharger is not required to analyze the composite samples collected under subsection (1) for ATG 6 of Schedule B if the direct discharger does not add phosphorus compounds to the biological treatment process.

MILLS USING BLEACHED PULP

BI-MONTHLY

17.-(1) Subject to subsection (2), each direct discharger that uses bleached pulp shall collect composite samples bi-monthly, sufficient to perform all of the analyses required by subsection (3), from each process effluent sampling point of that discharger.

(2) Where a direct discharger uses bleached pulp intermittently that discharger is exempted from the requirements of collecting composite samples bi-monthly under subsection (1) and shall instead, on a day when the mill is using bleached pulp, collect a composite sample monthly but for no more than six separate months, sufficient to perform all of the analyses required by subsection (3), from each process effluent sampling point of that discharger.

(3) Each direct discharger shall analyze the composite samples collected under subsections (1) or (2) for the ATG set forth in subsection 6(1) of Schedule A.

(4) For the purposes of subsection 17(2), monthly means on at least one operating day in each month and does not require at least two weeks between successive samplings.

COOLING WATER EFFLUENT

18.-(1) Each direct discharger shall collect composite samples monthly, sufficient to perform all of the analyses required by subsection (2), from each cooling water effluent sampling point of that discharger.

(2) Subject to subsection (3), each direct discharger shall analyze the composite samples collected under subsection (1) for the ATG's and parameters set forth in subsection 7(1) of Schedule A.

(3) A direct discharger that does not add chromium or zinc salts to its cooling water is exempted from analyzing the composite samples collected under subsection (1) for chromium and zinc.

WASTE DISPOSAL SITE EFFLUENT

19.-(1) Each direct discharger shall collect composite samples monthly, sufficient to perform all of the analyses required by subsection (2), from each waste disposal site effluent sampling point of that discharger.

(2) Subject to subsection (3), each direct discharger shall analyze the composite samples collected under subsection (1) for the ATG's set forth in subsection 8(1) of Schedule A.

(3) A direct discharger that does not dispose of chemical sludges at the waste disposal site is exempted from analyzing the composite samples collected under subsection (1) for the parameters in the ATG's numbered 9 and 12 listed in Schedule B.

BACKWASH EFFLUENT

20.-(1) Each direct discharger shall collect a grab sample of backwash effluent monthly, sufficient to perform all of the analyses required by subsection (2), from each backwash effluent sampling point of that discharger.

(2) Subject to subsection (3), each direct discharger shall analyze each grab sample collected under subsection (1) for the ATG's and parameters set forth in subsection 9(1) of Schedule A.

(3) A direct discharger that does not add aluminum compounds to its intake water is exempted from analyzing the sample collected under subsection (1) for aluminum.

EMERGENCY OVERFLOW

21.-(1) Each direct discharger shall collect a grab sample during each emergency overflow event, sufficient to perform all of the analyses required by subsection (3), from each emergency overflow sampling point of that discharger through which emergency overflow passes.

(2) Subsection (1) does not apply if the collection of grab samples would result in danger to health or safety.

(3) Each direct discharger shall analyze the grab sample collected under subsection (1) for the ATG's set forth in subsection 10(1) of Schedule A.

STORM WATER

22.-(1) Each direct discharger shall collect twice per year, during a storm event and with at least four months between successive samplings, a grab sample sufficient to perform all of the analyses required by subsection (2), from each sampling point established under subsections 6(2) and 6(3).

(2) Each direct discharger shall analyze the grab samples collected under subsection (1) for the ATG's set forth in subsections 11(1), 11(2), 11(3), 11(4), 11(5), 11(6), or 11(7) of Schedule A.

(3) A direct discharger that does not dispose of chemical sludges at the waste disposal site is exempted from analyzing the grab samples collected under subsection (1) for the parameters in the ATG's numbered 9 and 12 as set forth in subsection 11(5)

QUALITY CONTROL SAMPLES

DAILY AND THRICE WEEKLY MONITORING

23.-(1) Monthly, each direct discharger shall collect from one process effluent sampling point of that discharger, duplicate samples for each sample in a set of samples collected under subsection 7(1) and for each sample in a set of samples collected under subsection 8(1), and shall analyze each duplicate sample for the ATG's set forth in subsections 1(1) and 1(2) respectively, of Schedule A.

(2) Monthly, each direct discharger in the Sulphate (Kraft) Category shall collect from one process effluent sampling point of that discharger, duplicate samples for each sample in a set of samples collected under subsection 12(1) and shall analyze each

duplicate sample for the ATG's and parameters set forth in subsection 2(1) of Schedule A.

(3) Monthly, each direct discharger in the Sulphite-Mechanical and Corrugating Categories shall collect from one process effluent sampling point of that discharger, duplicate samples for each sample in a set of samples collected under subsection 14(1) and shall analyze each duplicate sample for the parameter set forth in subsection 3(1) of Schedule A.

(4) At the sample preparation area, each direct discharger in the Sulphate (Kraft) Category shall, bi-monthly and corresponding with a sampling event required under subsection (2), open, add preservatives where required, and reseal a travelling blank sample and then analyze that travelling blank sample for dichlorodehydroabiatic acid and dehydroabiatic acid.

(5) Each direct discharger in the Sulphate (Kraft) Category shall, bi-monthly and corresponding with a sampling event required under subsection (2), ensure that a travelling spiked blank sample accompanies the set of sample containers to the sample preparation area, and then analyze that travelling spiked blank sample for dehydroabiatic acid.

(6) At the sample preparation area, each direct discharger in the Sulphite-Mechanical and Corrugating Categories shall, bi-monthly and corresponding with a sampling event required under subsection (3), open, add preservatives where required, and reseal a travelling blank sample and then analyze that travelling blank sample for dehydroabiatic acid.

(7) Each direct discharger in the Sulphite-Mechanical and Corrugating Categories shall, bi-monthly and corresponding with a sampling event required under subsection (3), ensure that a travelling spiked blank sample accompanies the set of sample containers to the sample preparation area, and then analyze that travelling spiked blank sample for dehydroabiatic acid.

WEEKLY AND MONTHLY MONITORING

24.-(1) Once in each quarter, each direct discharger that collects a set of samples under subsection 16(1) shall collect from one process effluent sampling point of that discharger through which biologically treated effluent passes, duplicate samples for each sample in a set of samples collected under subsections 16(1) and shall analyze the duplicate samples for the ATG's set forth in subsection 5(1) of Schedule A except for the ATG's 4a, 4b and 6.

(2) Once in each quarter, each direct discharger shall collect from one process effluent sampling point of that discharger, duplicate samples for each sample in a set of samples collected under subsections 10(1) and shall analyze the duplicate samples for the ATG's set forth in subsection 1(4) of Schedule A except for ATG's 16 and 17.

(3) Once in each quarter, each direct discharger shall collect from one process effluent sampling point of that discharger, duplicate samples for each sample in a set of samples collected under subsections 10(3) and shall analyze the duplicate samples only for ATG's 16 and 17 of the ATG's set forth in subsection 1(4) of Schedule A.

(4) Once in each quarter, each direct discharger in the Sulphate (Kraft) Category shall collect from one process effluent sampling point of that discharger, duplicate samples for each sample in a set of samples collected under subsection 13(1), and shall analyze the duplicate samples for the ATG set forth in clause 2(2)(a) of Schedule A.

(5) Once in each quarter, each direct discharger in the Sulphate (Kraft) Category shall collect from one process effluent sampling point of that discharger, duplicate samples for each sample in a set of samples collected under subsection 13(3), and shall analyze the duplicate samples for the ATG set forth in clause 2(2)(b) of Schedule A.

(6) Once in each quarter, each direct discharger in the Deinking-Board-Fine Paper-Tissue Category that collects a set of samples under subsection 15(1) shall collect from one process effluent sampling point of that discharger, duplicate samples for each sample in a set of samples collected under subsection 15(1), and shall analyze the duplicate samples for the ATG set forth in clause 4(1)(a) of Schedule A.

(7) Once in each quarter, each direct discharger in the Deinking-Board-Fine Paper-Tissue Category that collects a set of samples under subsection 15(4) shall collect from one process effluent sampling point of that discharger, duplicate samples for each sample in a set of samples collected under subsection 15(4), and shall analyze the duplicate samples for the ATG set forth in clause 4(1)(b) of Schedule A.

(8) At the sample preparation area, each direct discharger shall, semi-annually and corresponding with the collection of duplicate samples required under subsection (2), open, add preservatives where required, and reseal a number of travelling blank samples sufficient to perform all of the analyses required under subsection (9).

(9) Each direct discharger shall analyze the travelling blank samples required under subsection (8) for the parameters in the ATG's numbered 9 and 12, 19 and 20, 23, and 26 of Schedule B.

(10) Each direct discharger shall, semi-annually and corresponding with the collection of duplicate samples required under subsection (2), ensure that a number of travelling spiked blank samples sufficient to perform the analyses required under subsection (11), accompany the set of sample containers to the sample preparation area.

(11) Each direct discharger shall analyze the travelling spiked blank samples required under subsection (10) for the parameters in the ATG's numbered 9 and 12, 19 and 20, 23, and 26 of Schedule B.

(12) At the sample preparation area, each direct discharger shall, semi-annually and corresponding with the collection of duplicate samples required under subsection (3), open, add preservatives where required, and reseal a number of travelling blank samples sufficient to perform all of the analyses required under subsection (13).

(13) Each direct discharger shall analyze the travelling blank samples required under subsection (12) for the parameters in the ATG's numbered 16 and 17 of Schedule B.

(14) Each direct discharger shall, semi-annually and corresponding with the collection of duplicate samples required under subsection (3), ensure that a number of travelling spiked blank samples sufficient to perform the analyses required under subsection (15), accompany the set of sample containers to the sample preparation area.

(15) Each direct discharger shall analyze the travelling spiked blank samples required under subsection (14) for the parameters in the ATG's numbered 16 and 17 of Schedule B.

(16) At the sample preparation area, each direct discharger in the Sulphate (Kraft) Category shall, semi-annually and corresponding with the collection of duplicate samples required under subsection (5), open, add preservatives where required, and reseal a travelling blank sample and then analyze that travelling blank sample for the parameters in the ATG numbered 24 of Schedule B.

(17) At the sample preparation area, each direct discharger in the Deinking-Board-Fine Paper-Tissue Category that collects duplicate samples under subsection (7) shall, semi-annually and corresponding with the collection of duplicate samples required under subsection (7), open, add preservatives where required, and reseal a travelling blank sample and then analyze that travelling blank sample for the parameters in the ATG numbered 24 of Schedule B.

BI-MONTHLY MONITORING

25.-(1) Semi-annually, each direct discharger that collects a set of samples under subsection 17(1) shall collect from one process effluent sampling point of that discharger, duplicate samples for each sample in a set of samples collected under subsection 17(1), and shall analyze the duplicate samples for the ATG set forth in subsection 6(1) of Schedule A.

(2) At the sample preparation area, each direct discharger that collects a set of duplicate samples under subsection (1) shall, at least once and corresponding with the collection of duplicate samples required under subsection (1), open, add preservatives where required and reseal a travelling blank sample and shall then analyze the travelling blank sample for the parameters in the ATG numbered 24 of Schedule B.

TRAVELLING SPIKED BLANK SAMPLE

26.-(1) Each travelling spiked blank sample required to be analyzed by subsections 23(5), 23(7), 24(10) and 24(14) shall be prepared with a standard solution containing at least the parameters to be analyzed for except that the travelling spiked blank sample prepared for resin and fatty acid analysis may be prepared with a standard solution of dehydroabietic acid only.

TOXICITY TESTING

27.-(1) Each direct discharger shall collect a sample from each process effluent sampling point of that discharger monthly and on the same day as samples are collected under subsection 10(1) and shall perform a toxicity test on each sample.

(2) If the fish toxicity tests performed under subsection (1) result in mortality for no more than five out of ten fish at each effluent concentration in three consecutive monthly tests, a direct discharger is exempted from the requirement under subsection (1) of performing a monthly fish toxicity test and shall thereafter, once in each quarter and on the same day as samples are collected under subsection 10(1), collect a sample from

each process effluent sampling point of that discharger and perform a fish toxicity test on each sample.

(3) If a fish toxicity test performed under subsection (2) results in mortality for more than five out of ten fish, subsection (2) ceases to apply and continues not to apply until the tests performed under subsection (1) in a further three consecutive months result in mortality for no more than five out of ten fish at each effluent concentration.

(4) Each direct discharger shall collect a sample from each cooling water effluent sampling point of that discharger once in each month, and on the same day as a set of samples required by subsection 18 (1) is collected, and shall perform a toxicity test on each of the samples collected under this subsection.

(5) If the fish toxicity test performed under subsection (4) result in mortality for no more than five out of ten fish at each effluent concentration in three consecutive monthly tests, a direct discharger may thereafter collect a sample from each cooling water effluent sampling point of that discharger once in each quarter, and on the same day as a set of samples required by subsection 18 (1) is collected, and perform a toxicity test on the 100% undiluted sample only.

(6) If a fish toxicity test performed under subsection (5) results in mortality for more than five out of ten fish, subsection (5) ceases to apply and continues not to apply until the tests performed under subsection (4) in a further three consecutive months result in mortality for no more than five out of ten fish at each effluent concentration.

FLOW MEASUREMENT

28.-(1) Each direct discharger shall continuously measure the flow of each process effluent stream of that discharger at a location or set of locations that are representative of the flow at the sampling point established on that process effluent stream and shall record the measured flow.

(2) Subject to subsection (3) and subsection 6(2) of the General Effluent Monitoring Regulation, each direct discharger shall demonstrate by calibration that each primary flow measurement device used to measure flow for the purposes of this Regulation is meeting the 5% accuracy requirement of subsection 6(1) of the General Effluent Monitoring Regulation and shall submit the supporting documentation to the Director in the initial report.

(3) Where a direct discharger demonstrates to the Director by means of a certified report of a registered professional engineer of the Province of Ontario that a primary device used to measure the flow of a process effluent stream has been designed and installed in accordance with the standards of a recognized national or international standards setting organization, that primary device will be deemed capable of meeting the accuracy requirement in subsection 6(1) of the General Effluent Monitoring Regulation.

(4) Where the flow of a process effluent stream cannot be continuously measured on any day because of equipment malfunction, the direct discharger may fulfil the requirements of subsection (1), by estimating the total daily flow and recording that estimate.

(5) Each direct discharger shall record the location, event duration, and approximate volume of each emergency overflow.

(6) Each direct discharger shall at the time of each sampling, using recognized engineering principles, estimate the flow of each cooling water effluent stream, backwash effluent stream or waste disposal site effluent stream of that discharger, at a location or set of locations representative of the flow at the sampling point established for that effluent stream, and shall record the estimated flow.

(7) Each direct discharger shall estimate the volume of storm water discharged by each point source storm water effluent stream for each storm event which is monitored pursuant to section 22.

REPORTING REQUIREMENTS

29.-(1) Within seven days after this subsection comes into force, each direct discharger shall submit an initial report as defined in subsection 7(1) of the General Effluent Monitoring Regulation to the Director.

(2) Each direct discharger shall, in the initial report submitted to the Director, include a plot plan or plans, along with supporting text, showing the location of each catchment area and the point of discharge of the related point source storm water effluent stream.

(3) Each direct discharger shall report any changes to the information submitted under subsection (1) to the Director within thirty days after the end of the month during which the change occurs.

(4) Each direct discharger shall report to the Director the results of all analyses performed by or on behalf of the direct discharger under sections 7 to 27 in accordance with the requirement of section 7 of the General Effluent Monitoring Regulation.

(5) Each direct discharger shall report to the Director the flow measurement information recorded in respect of each process effluent of that discharger.

(6) Each direct discharger shall report to the Director the estimated flow of cooling water effluent stream, backwash effluent stream, and each effluent stream from a waste disposal site that is discharged to a surface watercourse.

(7) Each direct discharger shall report to the Director the date, location, duration and approximate volume of effluent discharged during each emergency overflow.

(8) Each direct discharger shall report to the Director the date and estimated volume of storm water discharged by each point source storm water effluent stream for each event monitored pursuant to section 22.

(9) The reports referred to in subsections (5) to (8) shall be submitted to the Director in writing within thirty days after the end of the month in which the information was recorded.

(10) Each direct discharger shall keep records of all sampling required by this Regulation, including for each sample, the date and time of collection, sampling procedures used, the amount of sample dilution by preservative if dilution exceeds one per cent.

(11) Each direct discharger shall develop a maintenance and calibration schedule for all sampling equipment and shall record the results of all maintenance and calibration performed.

(12) Records of all analytical methods used shall be kept by the direct discharger.

(13) Each direct discharger shall submit a written report to the Director detailing the date, duration and cause of each malfunction or other problems which may have affected the information reported under this Regulation with respect to sampling, toxicity testing, analytical and flow measurement, together with any remedial action taken, within thirty days after the end of the month in which the malfunction or problem occurs.

(14) All records and reports required to be kept or made by this Regulation shall be retained by the direct discharger for a period of two years after this Regulation expires.

TIMING

30.-(1) This Regulation, except subsection 29(1), comes into force on the first day of the month following five months after promulgation.

(2) Subsection 29(1) comes into force on the first day of the month following three months after promulgation.

(3) This Regulation applies to direct dischargers for a period of twelve months after coming into force.

SCHEDULE A

MONITORING LIST

1.- PROCESS EFFLUENT - GENERAL REQUIREMENTS

DAILY

- | | | |
|-----|-----------------------------|----------------------------|
| (1) | COD/DOC (Only one required) | (ATG 1/ATG 5 respectively) |
| | pH | (ATG 3) |
| | Total Suspended Solids | (ATG 8a) |
| | Specific Conductance | (ATG 7) |

THRICE WEEKLY

- | | | |
|-----|------------------|------------|
| (2) | BOD ₅ | (ATG PP1) |
|-----|------------------|------------|

WEEKLY

- | | | |
|-----|----------|----------|
| (3) | Aluminum | (ATG 9) |
| | Zinc | (ATG 9) |

MONTHLY

- | | | |
|-----|-------------------------|------------------------------|
| (4) | Nitrogen - ammonia) | (ATG 4a) |
| | - Kjeldahl) | |
| | - nitrate/nitrite | (ATG 4b) |
| | Total Phosphorus | (ATG 6) |
| | Sector Characterization | (ATG 9,12,16,17,19,20,23&26) |

SEMI-ANNUALLY

- | | | |
|--------|---|------------|
| (5)(a) | Polychlorinated Biphenyls | (ATG 27) |
| (5)(b) | Open Characterization | |
| | i) Extractable Organic Compounds | (ATG. 28b) |
| | ii) Volatile Organic Compounds | (ATG. 28a) |
| (5)(c) | Chlorinated Dibenzo-p-dioxins
and Chlorinated Dibenzofurans. | (ATG 24) |

SCHEDULE A (cont)

PROCESS EFFLUENT - SPECIFIC REQUIREMENTS

2.- SULPHATE (KRAFT)

THRICE WEEKLY

(1)	Dichlorodehydroabiatic Acid	(ATG PP3)
	Dehydroabiatic Acid	(ATG 26)
	AOX	(ATG PP2)

MONTHLY

(2)(a)	Sulphide	(ATG 15)
(b)	Chlorinated Dibenzo-p-dioxins and Chlorinated Dibenzofurans.	(ATG 24)

3.- SULPHITE-MECHANICAL & CORRUGATING

THRICE WEEKLY

(1)	Dehydroabiatic Acid	(ATG 26)
-----	---------------------	----------

4.- DEINKING-BOARD-FINE PAPERS-TISSUE

MONTHLY

(1)(a)	AOX	(ATG PP2)
(b)	Chlorinated Dibenzo-p-dioxins and Chlorinated Dibenzofurans.	(ATG 24)

5.- MILLS OPERATING BIOLOGICAL TREATMENT PROCESSES

WEEKLY

(1)	Nitrogen - ammonia)	(ATG 4a)
	- Kjeldahl)	
	- nitrate/nitrite	(ATG 4b)
	Total Phosphorus	(ATG 6)
	Volatile Suspended Solids	(ATG 8b)

SCHEDULE A (cont)

6.- MILLS USING BLEACHED PULP:

BI-MONTHLY

- | | | |
|-----|---|----------|
| (1) | Chlorinated Dibenzo-p-dioxins
and Chlorinated Dibenzofurans. | (ATG 24) |
|-----|---|----------|

7.- COOLING WATER EFFLUENT - GENERAL REQUIREMENTS

MONTHLY

- | | | |
|-----|-----------------------------|----------------------------|
| (1) | COD/DOC (Only one required) | (ATG 1/ATG 5 respectively) |
| | pH | (ATG 3) |
| | Specific Conductance | (ATG 7) |
| | Total Suspended Solids | (ATG 8a) |
| | Total Chromium | (ATG 9) |
| | Total Zinc | (ATG 9) |

8.- WASTE DISPOSAL SITE EFFLUENT - GENERAL REQUIREMENTS

MONTHLY

- | | | |
|-----|-------------------------------|-----------|
| (1) | BOD5 | (ATG PP1) |
| | pH | (ATG 3) |
| | Kjeldahl Nitrogen & Ammonia | (ATG 4a) |
| | Total Phosphorus | (ATG 6) |
| | Total Suspended Solids | (ATG 8a) |
| | Total Metals | (ATG 9) |
| | Mercury | (ATG 12) |
| | Acid Extractables (Phenolics) | (ATG 20) |
| | Resin and Fatty Acids | (ATG 26) |

9.- BACKWASH EFFLUENT - GENERAL REQUIREMENTS

MONTHLY

- | | | |
|-----|-----------------------------|----------------------------|
| (1) | COD/DOC (Only one required) | (ATG 1/ATG 5 respectively) |
| | pH | (ATG 3) |
| | Total Suspended Solids | (ATG 8a) |
| | Aluminum | (ATG 9) |

SCHEDULE A (cont)

10.- EMERGENCY OVERFLOW EFFLUENT - GENERAL REQUIREMENTS

PER EVENT

(1)	COD/DOC (Only one required)	(ATG 1/ATG 5 respectively)
	pH	(ATG 3)
	Specific Conductance	(ATG 7)
	Total Suspended Solids	(ATG 8a)

11.- POINT SOURCE STORM WATER EFFLUENT - GENERAL REQUIREMENTS

TWICE PER YEAR

(1) Bark Storage Pile

BOD ₅	(ATG PP1)
pH	(ATG 3)
Total Suspended Solids	(ATG 8a)
Acid Extractables (Phenolics)	(ATG 20)
Resin and Fatty Acids	(ATG 26)

(2) Bulk Storage and Unloading Areas

COD/DOC (Only one required)	(ATG 1/ATG 5 respectively)
pH	(ATG 3)
Specific Conductance	(ATG 7)
Total Suspended Solids	(ATG 8a)

(3) Chip Storage Pile

BOD ₅	(ATG PP1)
pH	(ATG 3)
Total Suspended Solids	(ATG 8a)
Acid Extractables (Phenolics)	(ATG 20)
Resin and Fatty Acids	(ATG 26)

SCHEDULE A (cont)

11.-POINT SOURCE STORM WATER EFFLUENT - GENERAL REQUIREMENTS (cont)

(4) Coal Storage Pile

COD/DOC (Only one required)	(ATG 1/ATG 5 respectively)
pH	(ATG 3)
Nitrogen - ammonia)	(ATG 4a)
- Kjeldahl)	
Specific Conductance	(ATG 7)
Total Suspended Solids	(ATG 8a)
Total Metals	(ATG 9)
Mercury	(ATG 12)
Base-Neutral Extractables	(ATG 19)

(5) Waste Disposal Site

COD/DOC (Only one required)	(ATG 1/ATG 5 respectively)
pH	(ATG 3)
Specific Conductance	(ATG 7)
Total Suspended Solids	(ATG 8a)
Total Metals	(ATG 9)
Mercury	(ATG 12)
Acid Extractables (Phenolics)	(ATG 20)
Resin and Fatty Acids	(ATG 26)

(6) Waste Paper Storage

BOD ₅	(ATG PP1)
pH	(ATG 3)
Total Suspended Solids	(ATG 8a)
Acid Extractables (Phenolics)	(ATG 20)

(7) Wood Storage

BOD ₅	(ATG PP1)
pH	(ATG 3)
Total Suspended Solids	(ATG 8a)
Acid Extractables (Phenolics)	(ATG 20)
Resin and Fatty Acids	(ATG 26)

SCHEDULE B

ANALYTICAL LIST

COLUMN 1	COLUMN 2	COLUMN 3
ATG #	ANALYTICAL TEST GROUP (ATG)	PARAMETERS TO BE ANALYZED
1	Chemical Oxygen Demand	Chemical oxygen demand (COD)
3	Hydrogen ion (pH)	Hydrogen ion (pH)
4	Nitrogen	
a.	Ammonia plus Ammonium Total Kjeldahl nitrogen	Ammonia plus Ammonium Total Kjeldahl nitrogen
b	Nitrate + Nitrite	Nitrate + Nitrite
5	Organic carbon (DOC)	Dissolved Organic Carbon (DOC)
6	Total phosphorus	Total phosphorus
7	Specific conductance	Specific conductance
8	Suspended solids	
a.	Total suspended solids (TSS)	Total suspended solids (TSS)
b	Volatile suspended solids (VSS)	Volatile suspended solids (VSS)
9	Total metals	Aluminum Beryllium Cadmium Chromium Cobalt Copper Lead Molybdenum Nickel Silver Thallium Vanadium Zinc
12	Mercury	Mercury
15	Sulphide	Sulphide

SCHEDULE B (cont)

ANALYTICAL LIST

COLUMN 1	COLUMN 2	COLUMN 3
ATG #	ANALYTICAL TEST GROUP (ATG)	PARAMETERS TO BE ANALYZED
16	Volatiles, Halogenated	1,1,2,2-Tetrachloroethane 1,1,2-Trichloroethane 1,1-Dichloroethane 1,1-Dichloroethylene 1,2-Dichlorobenzene 1,2-Dichloroethane (Ethylene dichloride) 1,2-Dichloropropane 1,3-Dichlorobenzene 1,4-Dichlorobenzene Bromoform Bromomethane Carbon tetrachloride Chlorobenzene Chloroform Chloromethane Cis-1,3-Dichloropropylene Dibromochloromethane Dichlorobromomethane Ethylene dibromide Methylene chloride Tetrachloroethylene (Perchloroethylene) Trans-1,2-Dichloroethylene Trans-1,3-Dichloropropylene Trichloroethylene Trichlorofluoromethane Vinyl chloride (Chloroethylene)
17	Volatiles, Non-Halogenated	Benzene Styrene Toluene o-Xylene m-Xylene and p-Xylene

SCHEDULE B (cont)

ANALYTICAL LIST

COLUMN 1	COLUMN 2	COLUMN 3
ATG #	ANALYTICAL TEST GROUP (ATG)	PARAMETERS TO BE ANALYZED
19	Extractables, Base Neutral	Acenaphthene 5-nitro Acenaphthene Acenaphthylene Anthracene Benz(a)anthracene Benzo(a)pyrene Benzo(b)fluoranthene Benzo(ghi)perylene Benzo(k)fluoranthene Camphene 1-Chloronaphthalene 2-Chloronaphthalene Chrysene Dibenz(a,h)anthracene Fluoranthene Fluorene Indeno(1,2,3-cd)pyrene Indole 1-Methylnaphthalene 2-Methylnaphthalene Naphthalene Perylene Phenanthrene Pyrene
20	Extractables, Acid (Phenolics)	2,3,4,5-Tetrachlorophenol 2,3,4,6-Tetrachlorophenol 2,3,5,6-Tetrachlorophenol 2,3,4-Trichlorophenol 2,3,5-Trichlorophenol 2,4,5-Trichlorophenol 2,4,6-Trichlorophenol 2,4-Dimethyl phenol 2,4-Dinitrophenol 2,4-Dichlorophenol 2,6-Dichlorophenol 4,6-Dinitro-o-cresol 2-Chlorophenol 4-Chloro-3-methylphenol 4-Nitrophenol m-Cresol o-Cresol p-Cresol Pentachlorophenol Phenol

SCHEDULE B (cont)

ANALYTICAL LIST

COLUMN 1	COLUMN 2	COLUMN 3
ATG #	ANALYTICAL TEST GROUP (ATG)	PARAMETERS TO BE ANALYZED
23	Extractables, Neutral -Chlorinated	1,2,3,4-Tetrachlorobenzene 1,2,3,5-Tetrachlorobenzene 1,2,4,5-Tetrachlorobenzene 1,2,3-Trichlorobenzene 1,2,4-Trichlorobenzene 2,4,5-Trichlorotoluene Hexachlorobenzene Hexachlorobutadiene Hexachlorocyclopentadiene Hexachloroethane Octachlorostyrene Pentachlorobenzene
24	Chlorinated Dibenzo-p-dioxins and Chlorinated Dibenzofurans	2,3,7,8-Tetrachlorodibenzo-p-dioxin Octachlorodibenzo-p-dioxin Octachlorodibenzofuran Total heptachlorinated dibenzo-p-dioxins Total heptachlorinated dibenzofurans Total hexachlorinated dibenzo-p-dioxins Total hexachlorinated dibenzofurans Total pentachlorinated dibenzo-p-dioxins Total pentachlorinated dibenzofurans Total tetrachlorinated dibenzo-p-dioxins Total tetrachlorinated dibenzofurans
26	Fatty and Resin Acids	Abietic Acid Chlorodehydroabietic Acid Dehydroabietic Acid Isopimaric Acid Levopimaric Acid Neoabietic Acid Oleic Acid Pimaric Acid
27	Polychlorinated Biphenyls (PCBs) (Total)	PCBs (Total)
28a	Open Characterization	Volatile Organic Compounds
28b	Open Characterization	Extractable Organic Compounds
PP1	Biochemical Oxygen Demand (5 Day)	Biochemical Oxygen Demand (BOD5)
PP2	Adsorbable Organic Halide	Adsorbable Organic Halide (AOX)
PP3	Dichlorodehydroabietic Acid	Dichlorodehydroabietic Acid

SCHEDULE 1

SUPPLEMENTAL SAMPLING PRINCIPLES

Column 1 ANALYTICAL TEST GROUP #	Column 2 LABORATORY SAMPLE CONTAINER	Column 3 LABORATORY CONTAINER PRE-TREATMENT (ref. subsection 3(14) General Effluent Monitoring Regulation)	Column 4 TEST SPECIFIC SAMPLING PRECAUTIONS (ref. subsection 3(14) General Effluent Monitoring Regulation)	Col. 5 MIN. SAM. VOL.	Column 6 PRESERVATION METHOD (ref. subsection 3(17) General Effluent Monitoring Regulation)	Column 7 STORAGE TIME (DAYS)
BIOCHEMICAL OXYGEN DEMAND (BOD5)						
PP1	Sample containers and caps/ liners must be composed only of one or more of the following materials: fluorocarbon resin, polyethylene terephthalate, glass, polystyrene, polypropylene, high or low density polyethylene. Metallic foil should not be used.	Generally no pre-treatment required for new containers	If sample is high (>5%) in hydrocarbons or organic solvents, use glass or fluorocarbon resin sample container only.	500 ml	None	4
ADSORBABLE ORGANIC HALIDE (AOX)						
PP2	Amber glass or fluorocarbon resin with fluorocarbon resin lined cap	Generally no pre-treatment required for new containers	Fill sample container to the top leaving no air space.	1 L	None	14

SCHEDULE 1

SUPPLEMENTAL SAMPLING PRINCIPLES

Column 1 ANALYTICAL TEST GROUP #	Column 2 LABORATORY SAMPLE CONTAINER	Column 3 LABORATORY CONTAINER PRE-TREATMENT (ref. subsection 3(14) General Effluent Monitoring Regulation)	Column 4 TEST SPECIFIC SAMPLING PRECAUTIONS (ref. subsection 3(14) General Effluent Monitoring Regulation)	Col. 5 MIN. SAM. VOL.	Column 6 PRESERVATION METHOD (ref. subsection 3(17) General Effluent Monitoring Regulation)	Column 7 STORAGE TIME (DAYS)
DICHLORODEHYDROABIETIC ACID						
PP3		See ATG 26	See ATG 26	See ATG 2 6	See ATG 26	See ATG 26
RESIN AND FATTY ACIDS						
2 6	Abietic Acid Chlordehydroabietic Acid Dehydroabietic Acid Isopimaric Acid Levopimaric Acid Neoabietic Acid Oleic Acid Pimaric Acid	If pre-treatment necessary: Bottle: Sequence of extensive washing/hot water, detergent, water, distilled water. Bake at 300 C for 8 hr minimum or 3 rinses with pesticide grade or distilled in glass hexane and dichloromethane. Cap: No pre-treatment	Contact surfaces must be glass, fluoro-carbon resin or stainless steel.	800 ml	None	7

SCHEDULE 2

SUPPLEMENTAL ANALYTICAL PRINCIPLES & ANALYTICAL METHOD DETECTION LIMITS

Column 1 ANALYTICAL TEST GROUP #	Column 2 PARAMETERS	Column 3 SAMPLE PREPARATION METHOD PRINCIPLES	Column 4 INSTRUMENTAL MEASUREMENT METHOD PRINCIPLES	Column 5 ALTERNATE INSTRUMENTAL MEASUREMENT METHOD PRINCIPLES	Column 7 ANALYTICAL METHOD DETECTION LIMITS mg/l
BIOCHEMICAL OXYGEN DEMAND (BOD5)					
PP1 See Note 1		Preparation for measurement system as appropriate; e.g. destruction of chlorine, neutralization of pH, and stabilization of sample to 20 C. Preparation of seed and dilution water as appropriate. Dilution of sample to provide adequate oxygen depletion over five day period	Dissolved oxygen determination by Winkler Method or by oxygen electrode verified by Winkler Method for one sample per analytical run on days of analysis.	None	5
ADSORBABLE ORGANIC HALIDE (AOX)					
PP2	Total Adsorbable Organic Halide	Carbon adsorption (column or shaker) at pH 2 followed by nitrate wash, Dohrmann charcoal 100-200 mesh granular activated carbon or equivalent.	Pyrolysis in an oxygen rich atmosphere followed by microcoulometric analysis	None	0.05 See Note 2

Note 1 - For each analytical run perform the BOD5 of the batch seed and dilution water used with samples, and the BOD5 of the seeded dilution water spiked with one or more organic compounds; e.g. glucose and glutamic acid.

Note 2 - Based on 2,4,6-Trichlorophenol

SCHEDULE 2

SUPPLEMENTAL ANALYTICAL PRINCIPLES & ANALYTICAL METHOD DETECTION LIMITS

Column 1 ANALYTICAL TEST GROUP #	Column 2 PARAMETERS	Column 3 SAMPLE PREPARATION METHOD PRINCIPLES	Column 4 INSTRUMENTAL MEASUREMENT METHOD PRINCIPLES	Column 5 ALTERNATE INSTRUMENTAL MEASUREMENT METHOD PRINCIPLES	Column 7 ANALYTICAL METHOD DETECTION LIMITS mg/l
DICHLORODEHYDROABIETIC ACID PP3		See ATG 26	See ATG 26	See ATG 26	See ATG 26
RESIN AND FATTY ACIDS 26	Abietic Acid Chlorodehydroabietic Acid Dehydroabietic Acid Isopimaric Acid Levopimaric Neoabietic Acid Oleic Acid Pimaric Acid	pH adjusted to 9, Liquid/Liquid extraction with methyl t-butyl ether. Methylation with diazomethane.	Gas Chromatography/ Flame Ionization Detection Capillary Column	N/A	0.005

PART IV

THE EXPLANATORY NOTES TO THE EFFLUENT MONITORING
REGULATION FOR THE PULP AND PAPER SECTOR.

EXPLANATORY NOTES TO THE EFFLUENT MONITORING REGULATION FOR THE PULP AND PAPER SECTOR

INTRODUCTION

These explanatory notes are intended to clarify the sections of the Pulp and Paper Sector Effluent Monitoring Regulation.

In conjunction with the protocols and procedures outlined in the General Effluent Monitoring Regulation, this regulation specifies the monitoring requirements for mills including the requirements for sampling, analysis, flow measurement, toxicity testing and reporting.

SECTION 1: DEFINITIONS

This section of the regulation provides:

- * clarification of terms used in the regulation;
- * definitions of technical terms used in the regulation;
- * modifications to definitions which appear in the General Monitoring Regulation for suitable application to the pulp and paper sector.

The definitions in the General Effluent Monitoring Regulation have been applied to the Pulp and Paper Sector Regulation with the following exceptions:

- "characterization" or 'sector characterization' has been redefined in this regulation to reference the characterization list specific for this sector;
- "effluent" has been redefined to further clarify that only those discharges that discharge 'directly' to a surface watercourse will be monitored under this regulation;
- "emergency overflow" has been redefined to mean a diversion of effluent that bypasses the waste treatment system and is discharged to a surface watercourse;
- "grab sample" has been redefined to include the sample containers in column 2 of Schedule 1 of this regulation and to allow for samples to be transferred in a more practical time frame rather than 'immediately';
- "open characterization" has been redefined to only include the analytical test group 28;

- "operating day" has been redefined to allow the mills to set the twenty-four hour time period which must be specified in the initial report;
- "process effluent sampling point" has been redefined as a location in a process effluent stream, the "(c) requirement" in the general regulation was considered to be redundant and not enforceable;
- "sample" has been redefined to include combined sample;
- "travelling blank sample" and "travelling spiked blank sample" - defined to allow necessary preparation to be carried out in the "sample preparation area";
- "waste disposal site effluent" has been redefined to exclude from the definition the liquid that percolates through a waste disposal site ;
- "waste disposal site effluent sampling point" has been redefined as a location in a waste disposal site effluent stream, the "(c) requirement" in the General Regulation was considered to be redundant and not enforceable;

The other definitions in this regulation were necessary to the structure of the sector regulation. The following are worthy of mention:-

"combined sample" - included to allow certain mills to combine samples from two or more waste streams for the purpose of monitoring their discharges;

"composite sample" - included to clarify the methods by which composite samples may be obtained for the purposes of this regulation;

"contributory stream" - necessary to define 'combined sample';

"mill" - defined because the definition of 'plant' in the General Regulation was considered inappropriate for this sector in that it did not appear to cover associated manufacturing operations and effluent treatment systems located on the mill site;

"mill site" - defined to restrict the property which would be covered by the regulation to that property in the immediate vicinity of the mill. In this manner, off-site woodlands operations and lumbering operations which could be included under the definition of 'plant' in the General Regulation, are excluded;

"sample preparation area" - included to accommodate situations where sample bottles are not actually filled at the sampling point as presently required by the general regulation. At many mills, the filling of actual sample bottles at the sampling point will not be practical. Instead, composite sample containers will be collected by truck and returned to the mill laboratory where the actual sample bottles will be filled and prepared for shipment to outside laboratories;

"stream" - necessary to define 'contributory stream';

"waste" - defined to exclude wood wastes and bark which are being stored for use as fuel at a later date. In general, this exemption is intended to cover short term storage (six months or less) and the onus will be placed on mills wishing to claim exemption for materials which have been stored for longer periods to demonstrate to the Director that materials are actually being stored for fuel purposes.

Subsection 1(2) states that unless modified by this regulation, the definitions in the General Monitoring Regulation also apply to this regulation.

SECTION 2: PURPOSE

This section states the purpose of this regulation which is to establish a data base on the quality of effluents discharged from mills in the pulp and paper sector. This data base will quantify the amounts of parameters of concern discharged to surface watercourses and will be used in the development of effluent discharge limits.

SECTION 3: APPLICATION

This section lists each of the operating pulp and paper mills in Ontario which discharge effluents directly to surface watercourses and also establishes the mill categories used in this regulation.

Subsection (2) establishes that this regulation is a "sectoral effluent monitoring regulation" as defined in the general monitoring regulation.

Subsection (3) places the requirement on each mill to carry out its monitoring in the manner specified in the general regulation unless otherwise modified by this regulation.

Subsection (6) stipulates that effluent monitoring is not required on days when a mill is not operating and, therefore, not discharging process effluents.

SECTION 4: MONITORING

Subsection (1) establishes "Schedule A" in the regulation and requires that each mill shall monitor its effluents according to the requirements set out in Schedule A.

Schedule A is the monitoring list and it indicates the frequency of sampling and analytical requirements for the various types of effluents from mills in each of the categories.

Subsection (2) allows a mill to combine the samples from two or more effluent streams into a single sample providing the mill can satisfy the Regional Director of the Ministry that there are valid and useful reasons for so doing. Combining of samples is only expected to be allowed in cases where a single discharge is not monitored directly but rather by monitoring two or more effluents upstream which subsequently combine into the single discharge.

SECTION 5: ANALYSIS

Subsection (1) establishes "Schedule B" and relates the "Analytical Test Group" (ATG) requirements of Schedule A to the list in Schedule B.

Schedule B lists the analytical test group parameters that will apply to the pulp and paper sector and also lists the specific chemical compounds that are included in the respective test groups.

Subsection (2) requires that where analysis is required for individual parameters within an ATG, the sample preparation principles and the instrumental measurement principles to be used for analytical purposes shall be only those specified in the general monitoring regulation. For parameters that are not included in the general regulation, the subsection requires that the principles to be used are those specified in Schedule 2 of this regulation. The subsection also provides an exemption from analyzing for the remaining parameters in the ATG when only single parameters are required.

SECTION 6: SAMPLING POINTS

Subsection (1) requires mills to establish sampling points on each of the types of effluent stream listed where such effluent streams exist. (Note:- all mills will have at least one process effluent stream but may not have any of the other types of effluents)

Subsection (2) requires that all mills having stormwater point discharges which require monitoring, must establish sampling points on each of those stormwater streams.

Subsection (3) provides relief from sampling all stormwater point discharges for those mills which have more than one catchment area where the land use is for the storage of either bark, chips, waste paper or wood. In this case, the mill need only sample the largest catchment area in each of the above land use categories.

Subsection (4) requires mills to establish sampling points on contributory effluent streams in cases where combined sampling is being allowed.

Subsection (5) requires that the sampling points established under 6(1), 6(2), 6(3) and 6(4) shall be used to collect samples for the purposes of this regulation but also provides the option of changing the sampling points if approved by the Regional Director of the Ministry.

Appendix 1 lists the probable sampling points for each mill according to best current information available to the Ministry.

PROCESS EFFLUENTS - GENERAL REQUIREMENTS

These general requirements apply to all mills except as noted.

SECTION 7: DAILY

This section requires that mills must collect composite samples of process effluents on a daily basis and analyze these samples for:

COD/DOC
pH
Total suspended solids
Specific conductance

Mills have the option of performing either a COD or a DOC analysis but are not required to perform both.

SECTION 8: THRICE WEEKLY

This section requires that all mills must collect composite samples of process effluents three times per week and analyze these samples for:

BOD5

SECTION 9: WEEKLY

The definition of weekly requires that there should be at least two days between successive samplings.

This section requires that all mills must collect composite samples of process effluents once per week and analyze those samples for:

Aluminum
Zinc

SECTION 10: MONTHLY

The definition of monthly requires that there shall be a minimum period of two weeks between the collection of the samples from month to month.

Subsection (1) requires that all mills must collect composite samples of process effluents once per month.

Subsection (2) requires that the composite samples collected under (1) be analyzed for:

Nitrogen (ammonia, Kjeldahl, nitrite/nitrate)
Phosphorus
ATG's 9, 12, 19, 20, 23 and 26.

Subsection (3) requires that on the same day as composite samples are collected under subsection (1), mills are required to collect three equal volume grab samples at intervals of at least six hours over a twenty four hour period.

Subsection (4) requires the three grab samples collected under subsection (3) to be analyzed for:

ATG's 16 and 17.

Where mills have performed analyses for nitrogen and phosphorus on a weekly basis under Section 16, those mills do not have to perform additional sample collection and analysis to comply with this monthly requirement.

SECTION 11: SEMI- ANNUALLY

The definition of semi-annually requires that there be an interval of at least six months between samplings.

Subsection (1) requires that all mills must collect composite samples of process effluents twice per year.

Subsection (2) requires that the samples collected under (1) be analyzed for:

Polychlorinated biphenyls, (ATG 27).

Subsection (3) requires that all mills must perform an "open characterization" for extractable organic compounds, twice per year, using samples collected under 10 (1). (ie. on two of the same samples collected for sector characterization analysis.)

Subsection (4) requires that all mills must perform an "open characterization" for volatile organic compounds, twice per year, using samples collected under 10 (1). (ie. on two of the same samples collected for sector characterization analysis.)

Subsections (5) and (6) require that all mills must collect composite samples of process effluents twice per year and analyze the samples for:

Chlorinated dibenzo-p-dioxins and
chlorinated dibenzofurans.

PROCESS EFFLUENTS - SPECIFIC REQUIREMENTS

The following sections concern specific requirements applicable only to mills within respective categories. These requirements relate to the differences in processing which occur among mills in the different categories.

SECTION 12: Applicable To Kraft Mills

This section requires that each kraft mill must collect composite samples of process effluents three times per week and analyze the samples for:

dichlorodehydroabietic acid
dehydroabietic acid
AOX (adsorbable organic halides)

The section also requires that at least once per month, the samples collected under subsection (1) must be collected at the same time as samples are collected for sector characterization under subsection 10(1).

SECTION 13: Applicable To Kraft Mills

Subsections (1) and (2) require that each kraft mill must collect three equal volume grab samples at intervals of at least six hours over a twenty four hour period of process effluents once per month and analyze those samples for:

sulphide.

Also, subsection (1) requires that the grab samples be collected on the same day as samples are collected for sector characterization under subsection 10(1).

Subsections (3) and (4) require that each kraft mill must collect composite samples of process effluents once per month and analyze those samples for:

Chlorinated dibenzo-p-dioxins and
chlorinated dibenzofurans.

Subsection (3) states also that it is not necessary to collect these samples on the same day as samples are collected for sector characterization under subsection 10(1).

SECTION 14: Applicable To Sulphite-Mechanical & Corrugating Mills

This section requires that each mill in the Sulphite-Mechanical & Corrugating category must collect composite samples of process effluent three times per week and analyze those samples for:

dehydroabietic acid.

SECTION 15: Applicable To Deinking-Board-Fine Paper-Tissue Mills

Subsections (1), (2) and (3) require that any mill in the Deinking-Board-Fine Paper-Tissue category which uses chlorine or chlorine derivatives for bleaching fibre, must collect composite samples of process effluent once per month and analyze those samples for:

AOX (adsorbable organic halide).

Subsection (1) also requires that the composite samples be collected on the same day as samples are collected under section 10(1).

Subsections (4), (5) and (6) require that any mill in the Deinking-Board-Fine Paper-Tissue category which uses chlorine or chlorine derivatives for bleaching fibre, must collect composite samples of process effluent once per month and analyze those samples for:

Chlorinated dibenzo-p-dioxins
chlorinated dibenzofurans.

Subsection (1) states also that it is not necessary to collect these samples on the same day as samples are collected for sector characterization under subsection 10(1).

SECTION 16: Applicable To Mills Operating Biological Treatment Processes

This section requires that for those mills which operate biological treatment plants, composite samples of the process effluents that contain treated effluent must be collected weekly and analyzed for:

Nitrogen (ammonia, Kjeldahl, nitrate/nitrite)
Total Phosphorus
Volatile suspended solids.

Nitrogen and phosphorus analyses are only required where the mill adds either nitrogen compounds or phosphorus compounds to the biological treatment plant.

SECTION 17: Applicable To Mills Using Bleached Pulp

This section requires those mills which use bleached pulp continuously in their manufacturing operations to collect samples every two months and analyze the samples for chlorinated dibenzo-p-dioxins and chlorinated dibenzofurans.

Subsection (2) deals with those mills which use bleached pulp on an intermittent basis. For the purposes of this section "intermittently" means using bleached pulp in manufacturing operations on an infrequent basis for periods of greater than one operating day.

Subsection (2) exempts those mills which use bleached pulp on an intermittent basis from collecting samples every two months and requires them instead to collect one sample a month for chlorinated dibenzo-p-dioxin and chlorinated dibenzofuran analysis on

a day when the mill is using bleached pulp. Even if a mill uses bleached pulp intermittently more than one time in a month, the mill is only required to collect one sample for chlorinated dibenzo-p-dioxin and chlorinated dibenzofuran analysis in that month. This subsection also states that the maximum number of samples which a mill using bleached pulp intermittently is required to collect over the life of the regulation is six.

COOLING WATER

The requirements for sampling and analysis for cooling water are different than those for process effluents.

SECTION 18: Applicable To All Mills With Cooling Water Effluents

This section requires that all mills must collect composite samples of cooling water effluent once per month and analyze those samples for :

COD or DOC
pH
Specific conductance
Total suspended solids.

Any mill which adds chromium or zinc compounds to their cooling water is required in addition to analyze the samples for:

Total chromium
zinc.

WASTE DISPOSAL SITE EFFLUENT

Where a mill operates a waste disposal site on the mill site which produces a continuously flowing effluent or where the effluent is collected and stored for intermittent discharge to a receiving watercourse through a discharge point on the mill site, that mill is being required to monitor the effluent from the waste disposal site.

SECTION 19: Applicable To All Mills With Waste Disposal Site Effluents

This section requires that any mill having a waste disposal site effluent must collect a composite sample of that effluent once per month and analyze the samples for:

BOD5
pH
Kjeldahl nitrogen and ammonia
Total phosphorus

Total suspended solids
Acid extractables (ATG 20)
Resin and fatty acids. (ATG 26)

In addition, any mill which disposes of chemical sludges (eg. green liquor dregs or lime muds) at the waste disposal site is required to analyze the samples for:

Mercury
Total metals (ATG 9).

BACKWASH EFFLUENT

Many mills which take processing water from a river or lake treat this water prior to use in the mill, usually to remove suspended solids or turbidity. Such operations normally involve a filtering operation and/or a settling operation which requires periodic backwashing or purging. During backwashing or purging, the solids and other materials which have accumulated on the filter medium or in the settling device are usually flushed out and discharged to a watercourse. This backwash effluent is required to be monitored under the regulation.

SECTION 20: Applicable To All Mills With Backwash Effluents

This section requires that a grab sample of backwash effluent must be collected once per month and analyzed for:

COD or DOC
pH
Total suspended solids.

In addition, any mill which adds aluminum compounds to its intake water is required to analyze the grab sample for:

Aluminum.

EMERGENCY OVERFLOWS

Emergency overflows, in which process or other effluents are temporarily discharged through emergency overflow systems that bypass wastewater treatment are required to be monitored during each emergency event.

This requirement assumes that the collection of appropriate samples is physically possible during an event and that the event is of sufficient duration to allow samples to be collected.

SECTION 21: Applicable To All Mills With Emergency Overflow Effluents

This section requires that a grab sample of emergency overflow effluent must be collected during each emergency overflow event and analyzed for:

COD or DOC (one or the other is required)
pH
Specific conductance
Total suspended solids.

POINT SOURCE STORM WATER DISCHARGES

Stormwater sampling and analysis is being required for all point source stormwater discharge points (unless otherwise indicated) which discharge effluents originating from catchment areas as defined in the regulation. The definition of catchment area limits the requirement to monitoring only stormwaters which originate from specified land uses.

These land uses are:

bark storage	chip storage
wood storage	waste paper storage
coal storage	waste disposal site
bulk storage and unloading.	

SECTION 22: Applicable To All Mills With Point Source Storm Water Effluents

This section requires that storm water grab samples must be collected twice per year from each point source stormwater effluent sampling points established by mills under subsections 6(2) and 6(3). The section further requires that the samples must be analyzed for the parameters listed in subsection (9) of Schedule A in accordance with the requirements for the respective land uses.

Subsection (3) provides an exemption from analyzing waste disposal storm water samples for ATG's 9 and 12 (metals) if the mill does not dispose of chemical sludges at the waste disposal site.

There are a number of mills which do not have catchment areas as defined by the regulation. These mills are not required to monitor stormwaters.

QUALITY CONTROL SAMPLES

Quality control samples are being required to provide assurance on the quality of the data being generated and to provide any indication of field contamination. Quality control samples are only required for process effluents as these are the more frequently monitored and will be used in the development of effluent limits.

As part of QA/QC procedures, **duplicate samples** are being required for process effluent samples in the various mill categories, at differing frequencies. Duplicate samples are intended to be separate samples of the same effluent, taken in a way which minimizes the differences between the effluent sample and the duplicate. Ideally, this is best accomplished by taking two separate samples directly from the effluent at the same time and there are automatic samplers which allow for this. The Ministry recognizes, however, that not all mills will have automatic samplers which allow for the collection of true duplicate samples. In these cases, the Ministry is prepared to accept "duplicates" that are prepared by collecting a second sample from a composite sample container. It could be argued that such samples are not truly duplicates but should be more correctly labelled "replicates." Notwithstanding this argument, for the purposes of the regulation such samples will be called "duplicates."

Travelling blank samples are also being required as part of the QA/QC procedures. Travelling blank samples are samples of uncontaminated water which are placed in a sample bottle at the laboratory, taken to the site at which effluent samples are collected and then opened at that site while the effluent samples are being collected. The idea behind these blanks is to determine whether any extraneous contamination could be gaining access to the samples from the atmosphere or from handling techniques.

The Ministry recognizes that in some cases, the actual site at which the samples are collected may not be the best location at which to open the blanks. For example, a mill may collect a composite sample container and transport that container to a different location where the contents are transferred into the sample bottles for shipment to a laboratory. It can be argued that this second location is a more valid location for the opening of the blanks. To provide for this alternative, the regulation defines "sample preparation area" and requires that travelling blanks be opened, preserved where necessary and then resealed at the sample preparation area. In most cases the sample preparation area is expected to be the mill laboratory but the definition does not preclude the use of the sampling point or some other convenient location.

Travelling spiked blank samples are a third requirement of the QA/QC procedures. These spiked blanks are samples of uncontaminated water which have been "spiked" with a known amount of one or more chemicals. These spiked samples are normally prepared at the analytical laboratory, sealed and shipped to the mill. At the mill, they should then accompany the sample bottles used for the collection of samples to the sample preparation area and be returned to the analytical laboratory, unopened, for analysis. The purpose of having the spiked samples accompany the other samples is to determine whether there has been any change in the concentration of the chemical spike(s) attributable to the handling, storage or transportation of the sample which should be taken into account when interpreting results.

The regulation requires that travelling spiked blank samples must be taken to the sample preparation area and then accompany the effluent samples back to the laboratory for analysis.

The requirements for duplicate samples, travelling blank samples and travelling spiked blank samples are set out in Sections 23, 24 and 25 of the regulation. Care should be taken to ensure that a sufficient number of duplicate sample bottles are collected and that a sufficient number of travelling blank sample bottles are opened, preserved where necessary and resealed, and that sufficient travelling spiked blank samples accompany the effluent samples, to enable all of the QA/QC analytical requirements to be performed as required under these same sections of the regulation.

SECTION 26: Travelling Spiked Blank Sample

This section requires that travelling spiked blank samples shall be prepared with a standard solution which must contain at least the parameters required for analysis by the subsection with the exception that the travelling spiked blank sample prepared for resin and fatty acid analysis can be prepared with a standard solution of dehydroabietic acid only.

TOXICITY TESTING

Toxicity testing is being required on all process effluent streams and all cooling water effluent streams on a once-per-month basis unless otherwise stipulated.

Toxicity testing will require testing by both rainbow trout and *Daphnia magna*.

A mechanism is provided whereby the frequency of rainbow trout testing may be reduced if during the test, 5 or more of the 10 test fish survive at each dilution in each of three consecutive monthly tests.

SECTION 27: Applicable To all Mills

Subsection (1) requires each mill to collect samples of each process effluent stream once per month at the same time as analytical samples are collected pursuant to subsection 10(1) for sector characterization, and to perform rainbow trout and *Daphnia magna* toxicity tests on the samples collected.

Subsection (2) allows a mill to reduce the frequency of rainbow trout toxicity testing for a given process effluent to quarterly, if for three consecutive monthly tests, 5 or more of the ten fish tested survive at all dilutions. The requirement under subsection (1) to conduct monthly *Daphnia magna* toxicity tests is not changed.

Subsection (3) removes the frequency reduction allowance in the event that subsequent tests fail to satisfy the requirements of subsection (2).

Subsection (4) requires each mill to collect samples of each cooling water effluent stream once per month and at the same time as analytical samples are collected pursuant to subsection 18(1) and to perform rainbow trout and *Daphnia magna* toxicity tests on the samples collected.

Subsection (5) allows a mill to reduce the frequency of toxicity testing from monthly to quarterly for a given cooling water effluent if for three consecutive monthly tests, five or more of the ten fish tested in the rainbow trout segment of the toxicity test survive at all dilutions. The reduced frequency of testing includes both the *Daphnia magna* and rainbow trout segments of the toxicity test.

Subsection (6) removes the frequency reduction allowance in the event that subsequent tests fail to satisfy the requirements of subsection (5).

FLOW MEASUREMENT

The general monitoring regulation prescribes the levels of accuracy required for primary and secondary flow measuring devices to be used in the MISA monitoring programme.

To avoid expenditures by mills which would only result in a marginal increase in flow measuring accuracy or that would result in the installation of devices that could become redundant in the future when treatment systems are installed under a limits regulation, the Ministry is prepared to accept the use of existing devices providing a mill can demonstrate by calibration that the overall accuracy of a existing device is less than $\pm 15\%$. This provision is allowed under subsection 6(2) of the general effluent monitoring regulation.

SECTION 28: Applicable To All Mills

Subsection (1) requires that the flow of each process effluent stream shall be measured. The accuracy requirements of the General Regulation will apply.

Subsection (2) requires a mill to calibrate its primary flow measuring devices and document to the Director in the Initial Report that its devices are meeting the plus or minus 5% accuracy required under the general effluent monitoring regulation. Exemptions to this requirement allow the alternatives provided by subsection 28(3) of the sectoral regulation or subsection 6(2) of the general effluent monitoring regulation

Subsection (3) allows a mill to certify that a flow measuring device was designed and installed according to an accepted national or international code, in which case the device will be deemed to meet the $\pm 5\%$ accuracy requirement and the mill is also relieved of the obligation to perform an initial calibration of the device.

Subsection (5) requires a mill to record information with respect to each emergency overflow.

Subsection (6) requires a mill to estimate the flows of effluent streams other than process effluents, using recognized engineering principles and to record the estimated flow.

Subsection (7) requires a mill to estimate the flow of stormwater at each stormwater discharge point being sampled by using recognized engineering principles.

REPORTING REQUIREMENTS

All mills are required to report all monitoring data to the Ministry. Electronic data reporting systems have been developed by the Ministry which will be used by the mills to report the data.

SECTION 29: Applicable To All Mills

The requirements of subsections (1) through (14) are straightforward and require no further clarification.

TIMING

This section deals with the times at which various requirements of the regulation come in to force and expire.

SECTION 30 Applicable To All Mills

Subsection (1) states that actual monitoring of effluents will commence 5 months after the regulation is promulgated. This will allow mills a five-month period in which to ensure that all the necessary flow measuring and sampling devices are installed and that analytical capability is provided.

Subsection (2) provides a three-month period following promulgation of the regulation for mills to prepare and submit the initial report required by subsection 29.- (1).

Subsection (3) states that the regulation will be in force for a period of twelve months - ie., mills will be required to monitor their effluents for a period of not longer than twelve months.

INTAKE WATER MONITORING

Although not covered in the regulation, the Industry expressed a concern that intake water quality should be considered in the development of limits regulations, particularly for certain mills where it is known that high concentrations of certain parameters of concern are present in the intake water. The Industry believes that "net loadings" should be used in all cases. The ministry does not agree with the use of net loadings but has acknowledged that mills with a concern should be allowed to report intake water data along with the monitoring data.

Where a mill believes that its intake water may contain significant concentrations of one or more of the parameters being monitored under the regulation, that mill will be allowed to report intake water monitoring data provided the data are collected under MISA quality control and quality assurance procedures.

Any mill wishing to report intake water data should identify this intent in the "Initial Report to the Director" together with the QA/QC information on the collection of the data and the reasons why the intake water data are considered important.

Sampling frequency requirements for intake water monitoring will be the same as the frequency required for that compound or parameter in the monitoring regulation.

RESIDUAL CHLORINE DETERMINATION IN TOXICITY TESTING OF COOLING WATERS

Concerns were expressed by the Industry that many of its cooling water effluents might prove toxic to rainbow trout as the result of the presence of residual chlorine in concentrations above the toxicity threshold limit. The Industry argued that the regulation should provide for the analysis of residual chlorine in cooling water samples prior to any toxicity testing. The Ministry was willing to accommodate this concern but has not been able to provide an analytical protocol for residual chlorine determination which could be defensible in a regulation.

Recognizing the importance of this concern to the Industry, the Ministry is prepared to allow mills to report the residual chlorine content of cooling water samples used for toxicity testing purposes. The mill should use a method for determining residual chlorine content which it believes to be reliable.

Any mill wishing to report residual chlorine data along with its toxicity test data should notify the Regional Director at the same time as the initial report is submitted and should inform the Director of the analytical test method that will be used.

A P P E N D I X I

KRAFT MILLS	DISCHARGE POINT	MISA CLASS
*Boise-Cascade Canada Ltd., Fort Frances	Final Effluent	G+K
	Point Source Storm Water Effluent	T,W
	Point Source Storm Water Effluent	W
*Canadian Pacific Forest Products Ltd, Dryden	Final Effluent	G+K
	Point Source Storm Water Effluent	T,F
	Point Source Storm Water Effluent	C
	Point Source Storm Water Effluent	B
	Point Source Storm Water Effluent	D,W,C
Canadian Pacific Forest Products Ltd, Thunder Bay	Final Effluent	G+K
	Clean Water Outfall	CWE
	Point Source Storm Water Effluent	T
	Point Source Storm Water Effluent	F
	Point Source Storm Water Effluent	C,B
	Point Source Storm Water Effluent	D,W
	Point Source Storm Water Effluent	W
	Point Source Storm Water Effluent	W,C
Domtar Inc., Fine Papers Division, Cornwall	Final Effluent	G+K
	Point Source Storm Water Effluent	D
	Point Source Storm Water Effluent	D
	Point Source Storm Water Effluent	W
	Point Source Storm Water Effluent	D
Domtar Inc., Containerboard Division, Red Rock	Final Effluent	G+K
	Point Source Storm Water Effluent	C,T
*E.B. Eddy Forest Products Ltd., Espanola	Final Effluent	G+K
	Clarifier Overflow	G+K
	Point Source Storm Water Effluent	T,C
	Point Source Storm Water Effluent	W,C,B
	Point Source Storm Water Effluent	D
James River Marathon, Marathon	Final Effluent	G+K
	Cooling Water	CWE
	Cooling Water	CWE
	Point Source Storm Water Effluent	T
	Point Source Storm Water Effluent	C
	Point Source Storm Water Effluent	W
	Point Source Storm Water Effluent	B
	Point Source Storm Water Effluent	B,D
Kimberly-Clark of Canada Limited, Terrace Bay	Alkaline Sewer + Acid Sewer Combined Sample	G+K
	Point Source Storm Water Effluent	W
	Point Source Storm Water Effluent	C
	Point Source Storm Water Effluent	T
Malette Kraft Pulp & Power Div., Smooth Rock Falls	Final Effluent	G+K
	Waste Disposal Site Effluent	WDSE
	Point Source Storm Water Effluent	T,W,C
	Point Source Storm Water Effluent	T
	Point Source Storm Water Effluent	W

A P P E N D I X I

MECHANICAL/SULPHITE	DISCHARGE POINT	MISA CLASS
Abitibi-Price, Fort William Division	Final Effluent	G+S/M
	Bark Lagoon Effluent	G+S/M
	Point Source Storm Water Effluent	W,C,B
	Point Source Storm Water Effluent	W,B
Abitibi-Price, Iroquois Falls Division	Final Effluent	G+S/M
	Filter Plant Backwash	BWE
	Cooling Water	CWE
	Point Source Storm Water Effluent	D
	Point Source Storm Water Effluent	W
	Point Source Storm Water Effluent	T,C,B
Abitibi-Price, Thunder Bay Division	Final Effluent	G+S/M
	Point Source Storm Water Effluent	C
	Point Source Storm Water Effluent	W
Abitibi-Price Fine Papers Division	Final Effluent	G+S/M
	Point Source Storm Water Effluent	D,W,B
	Point Source Storm Water Effluent	W
Boise-Cascade Canada Ltd., Kenora	Final Effluent	G+S/M
	Point Source Storm Water Effluent	T,W,B
*Quebec And Ontario Paper Company Ltd.	Final Effluent	G+S/M
Spruce Falls Power and Paper Company Limited	Final Effluent	G+S/M
	Point Source Storm Water Effluent	T
	Point Source Storm Water Effluent	T,F
	Point Source Storm Water Effluent	T,W,C
	Point Source Storm Water Effluent	T
	Point Source Storm Water Effluent	W
St Marys Paper Inc.	Final Effluent	G+S/M
CORRUGATING MILLS		
Domtar Inc., Containerboard Division, Trenton	Final Effluent	G+C
	Point Source Storm Water Effluent	T,W
	Point Source Storm Water Effluent	D,W,R
	Point Source Storm Water Effluent	D,W
MacMillian-Bloedel Ltd.	Black Liquor Overflow	G+C
	Clean Water Effluent	G+C
	Clarifier Overflow	G+C
	Point Source Storm Water Effluent	W,C
	Point Source Storm Water Effluent	D,C
	Point Source Storm Water Effluent	W
	Point Source Storm Water Effluent	F

APPENDIX I

DEINKING/BOARD/FINE PAPER/ISSUE	DISCHARGE POINT	MISA CLASS
Beaver Wood Fibre Co. Ltd.	Final Effluent	G+D/B/FP/T
	Spill Pond Overflow	CWE
Domtar Inc, Fine Papers Division, St. Catharines	Final Effluent	G+D/B/FP/T
E.B. Eddy Forest Products Ltd., Ottawa	Final Effluent	G+D/B/FP/T
*Fraser Inc, Thorold	Final Effluent	G+D/B/FP/T
Kimberly-Clark of Canada Limited, Huntsville	Final Effluent	G+D/B/FP/T
	Point Source Storm Water Effluent	T
Kimberly-Clark of Canada Limited, St. Catharines	Final Effluent	G+D/B/FP/T
*Strathcona Paper Company, Strathcona	Final Effluent	G+D/B/FP/T
	Cooling Water & Filter Plant BW	CWE
Trent Valley Paperboard Mills Division, Trenton	Final Effluent	G+D/B/FP/T
	Cooling Water	CWE
	Cooling Water	CWE
	Cooling Water	CWE
	Cooling Water	CWE
	Cooling Water	CWE
	Point Source Storm Water Effluent	R
Explanation of symbols used.		
E	Estimates of total daily volume. Volume measured as m3/day	
G+K	Process effluent general requirements plus Kraft Mill requirements	
G+S/M	Process Effluent general requirements plus Sulphite-Mechanical requirements	
G+C	Process effluent general requirements plus Corrugating Mill requirements	
G+D/B/FP/T	Process effluent general requirements plus Deinking-Board-Fine Paper-Tissue requirements	
CWE	Cooling Water Effluent general requirements	
BWE	Backwash Effluent general requirements	
WDSE	Waste disposal Site Effluent requirements	
B	Point source storm water effluent, bark storage requirements	
C	Point source storm water effluent, chip storage requirements	
D	Point source storm water effluent, disposal site requirements	
F	Point source storm water effluent, coal storage requirements	
R	Point source storm water effluent, waste paper storage requirements	
T	Point source storm water effluent, bulk storage and unloading requirements	
W	Point source storm water effluent, wood storage requirements	
*	Operate a biological treatment plant	

PART V

MISA ADVISORY COMMITTEE REPORT REGARDING
THE DRAFT EFFLUENT MONITORING REGULATION
FOR THE PULP AND PAPER SECTOR.



Ontario

Ministry
of the
Environment

Ministère
de
l'Environnement

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M4V 1P5

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Bureau 100
Toronto (Ontario)
M4V 1P5

January 27, 1989

The Honourable Jim Bradley
Minister of the Environment
135 St. Clair Avenue West
Toronto, Ontario
M4V 1P5

Dear Mr. Minister:

Attached is the MISA Advisory Committee Report Regarding the Draft Effluent Monitoring Regulations for the Pulp and Paper Sector, provided in response to your letter of December 16, 1988.

The report has the unanimous support of MISA Advisory Committee members, including the representative of the Pulp and Paper Sector, Mr. Mickey Devine.

The Committee recognizes that this regulation has been developed over the past two-plus years and represents the diligence and good faith of both negotiating parties. The Committee members would be pleased to discuss this report with you and your staff at any time.

Respectfully submitted,

Jim MacLaren, Chairman
for the MISA Advisory Committee

ONTARIO MINISTRY OF THE ENVIRONMENT
MUNICIPAL/INDUSTRIAL STRATEGY FOR ABATEMENT

MISA ADVISORY COMMITTEE

REPORT regarding the
EFFLUENT MONITORING REGULATIONS FOR
THE PULP AND PAPER SECTOR

January 1989

Jim MacLaren
Chairman

MISA ADVISORY COMMITTEE REPORT regarding the EFFLUENT MONITORING
REGULATIONS FOR THE PULP AND PAPER SECTOR

1. INTRODUCTION

The documents comprising the draft Effluent Monitoring Regulations for the Pulp and Paper Sector were referred by the Minister of the Environment to the MISA Advisory Committee on December 16, 1988 in advance of Committee Meeting 42 held on that date. At meetings 42 and 43 (January 13, 1989), the Committee received input from Ministry staff and representatives of the industrial sector.

At meeting 43, the revised draft regulation was presented as a joint submission of the industry and the Ministry. Agreement had been reached at the Joint Technical Committee level on upgraded characterization and dioxin monitoring. As well, there was agreement reached at this meeting for the inclusion of PCB monitoring on a semi-annual basis across the sector.

2. ADVICE TO THE MINISTER

The MISA Advisory Committee has reviewed the draft regulation package, and generally supports the regulation.

The MISA Advisory Committee recommends that the regulation package be released for public scrutiny.

3. REGULATION-SPECIFIC RECOMMENDATIONS

The MISA Advisory Committee has reviewed the issue of dioxin monitoring and recommends the following approach:

- for mills producing bleached kraft pulp, dioxin analysis monthly (twelve times)
- for mills using but not producing bleached kraft pulp, dioxin analysis bi-monthly (six times)
- for operations not using bleached kraft pulp, dioxin analysis twice during the year of monitoring

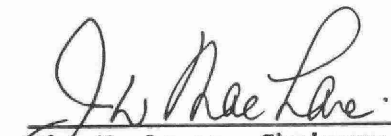
4. PROGRAM-SPECIFIC RECOMMENDATIONS

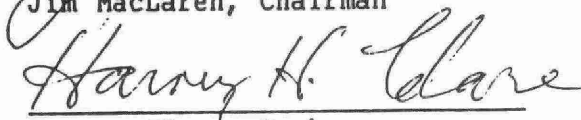
The MISA Advisory Committee recognizes the alternative approach to toxicity testing being applied in this regulation. In the sense that this approach is not consistent with the approach developed for previous regulations, the Committee recommends that the Ministry advance its pending policy on toxicity testing, thus giving direction to this question of consistency and comparability of results.

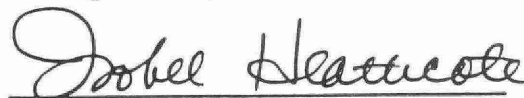
MISA Advisory Committee Report regarding the Draft Monitoring
Regulations for the Pulp and Paper Sector;

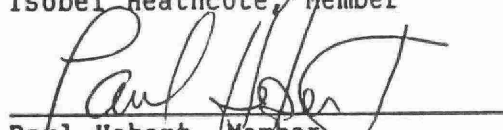
Submitted, January 27, 1989

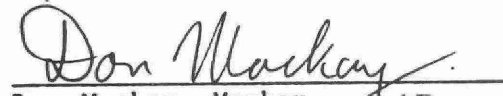
MISA ADVISORY COMMITTEE

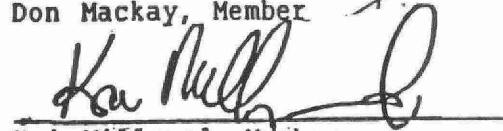

Jim MacLaren, Chairman

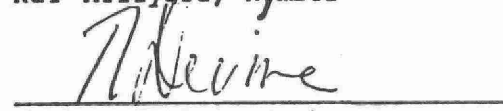

Harvey Clare, Member


Isobel Heathcote, Member


Paul Hebert, Member


Don Mackay, Member


Kai Millyard, Member


Mickey Devine, Member, representing
the Pulp and Paper Sector

PART VI

MINISTRY OF THE ENVIRONMENT RESPONSE

TO THE

MISA ADVISORY COMMITTEE REPORT.



Ontario

Office of the
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Ministry
of the
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02M1601

Mr. J. MacLaren
Chairman
MISA Advisory Committee
Suite 502
112 St. Clair Avenue West
Toronto, Ontario
M4V 1N3

Dear Mr. MacLaren:

I would like to thank you and the members of the MISA Advisory Committee (MAC) for your review of the Draft Effluent Monitoring Regulation for the Pulp and Paper Sector.

I am attaching the Ministry's response to specific recommendations made by MAC on the Draft Regulation.

I hope that this response will assist members of the public in reviewing the regulation and providing comments.

Yours sincerely,

A handwritten signature in cursive script, reading "Jim Bradley".

Jim Bradley
Minister

Enclosure

RESPONSE TO THE MISA ADVISORY COMMITTEE
RECOMMENDATIONS ON THE PULP AND PAPER SECTOR
EFFLUENT MONITORING DRAFT REGULATION

Throughout the regulation development process, the MISA Advisory Committee (MAC) has reviewed selected drafts of the regulation and provided comments to the Joint Industry/Government Technical Committee for the Pulp and Paper Sector (JTC). Many of these comments have been accepted and incorporated into successive versions of the Draft Regulation package. The Committee, after reviewing the penultimate draft, submitted its report which is available for public review.

The major recommendations from MAC and the corresponding MOE responses are provided as follows:

1) Dioxin Analysis

MAC's Recommendation

The Committee made the following specific recommendations with respect to the frequency of monitoring for "dioxins":

- for mills producing bleached kraft pulp, dioxin analysis monthly (twelve times)
- for mills using but not producing bleached kraft pulp, dioxin analysis bi-monthly (six times)
- for operations not using bleached kraft pulp, dioxin analysis twice during the year of monitoring.

MOE Response

The Ministry accepts the recommendations with respect to dioxin monitoring and they have been incorporated into the final draft of the regulation.

2) Policy on Toxicity Testing

MAC's Recommendation

The MISA Advisory Committee commented on the alternative approach taken towards toxicity testing in the Pulp and Paper Sector Effluent Monitoring Regulation, noting that it was not consistent with approaches taken in previous regulations. The Committee recommended that the Ministry advance its pending policy on toxicity testing.

MOE Response

The Ministry recognized there was deviation in the approach towards toxicity testing in the Pulp and Paper Sector Effluent Monitoring Regulation, but also recognized that based on the large amount of historical data available for this sector, the changes would not likely impact on the quality or utility of the data to be collected under the Regulation.

The Ministry is proceeding to finalize its policy on toxicity testing.